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For Your  
TRS-80® Model 100  
and Tandy 2000

# PCM

The Magazine for Professional Computing Management™

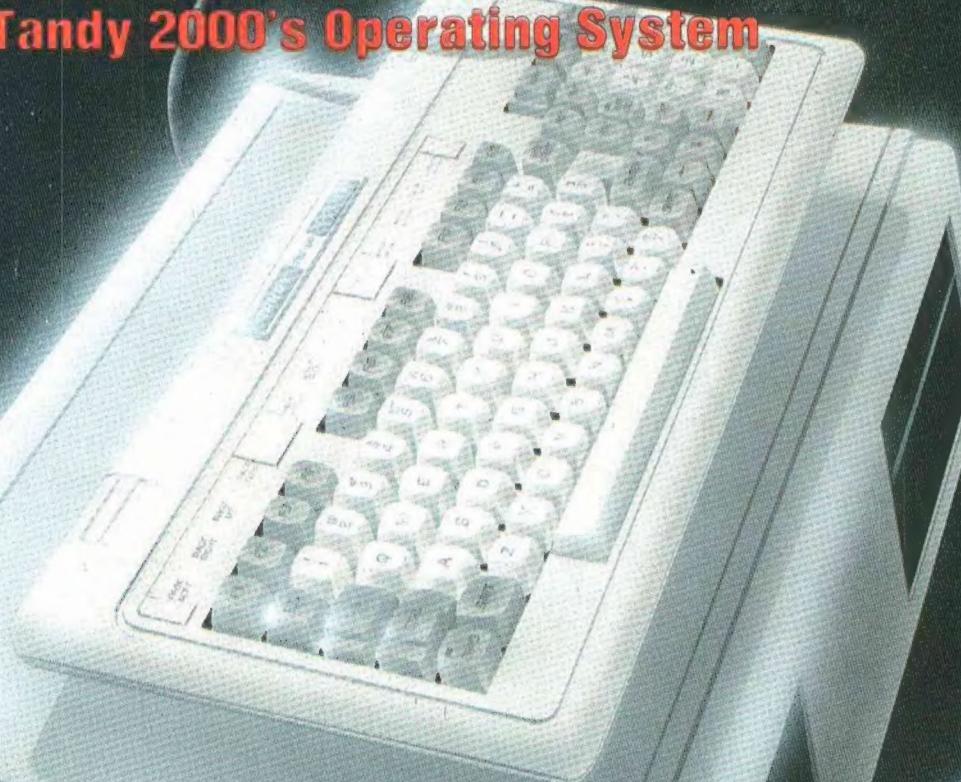
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Vol. 1 No. 11

May 1984

## 2000 and 100: A Computing Odyssey

Introducing 'MS-DOSSier'  
A New Series on the  
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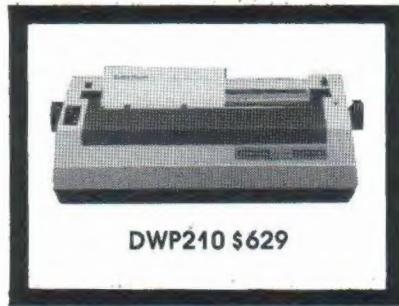
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# An Expanding Resource

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**W**e are really gratified by the initial reaction to our special move into the bar code field last month. As you will note, there are more bar codes in this month's issue and that is something that you will see continuing.

The reaction has been really good and we hope to hear from more of you about bar codes. We know we're not the first magazine ever to print a bar code — but we are the first one ever to make a commitment to printing bar codes on a regular basis. That is a significant step for us and we are very pleased to be able to be a part of it. We think, too, that it will be a major step in the computer magazine industry as a whole.

But, truth be it known, as you can see from the pages we printed both this month and last, it takes a whale of a lot of bar code to produce BASIC programs. One of the ways that we do this is to have a bigger magazine. We have done this now, with the size of PCM increasing in order to accommodate some additional bar codes, as well as for another reason which I'll go into in a minute.

But, let me say that one of the ways that any magazine is able to increase in size is for us to be able to sell more advertising. And you can help us in that area. Yes, I know it is trite, but I would greatly appreciate it if — when you contact an advertiser — you tell them you saw their ad in PCM. This is really an excellent way for an advertiser to judge how effective his dollars are spent. And, it will help us grow. The more we grow, the more programs we can run, the more bar codes we can print and the more useful we can be to you. So, please, do help us by mentioning PCM whenever you contact one of our advertisers (or, for that matter, if you contact a non-advertiser, mention us to them, too).

Besides bar codes and size, you may have noticed another change in PCM. The "subtitle" now says it is the magazine for "Professional Computing Management." This subtitle — the name is still PCM — more accurately reflects, I think, the direction we are going.

Part of this is because, beginning this month, we will be expanding to cover the Tandy 2000 as well. You may have noted that I said last month I saw the 2000 and the Portable Computer as natural partners. In relation to that, we think this magazine will be able to reflect this partnership by, first of all, wedding the Portable and the 2000 and, secondly, adding programs written specifically for the 2000.

This is the second reason we plan to expand the size of PCM. We will, in effect, be adding another computer to the ones which we cover in these pages. And, while we think that is natural because of the way that they go together so well, we believe it only proper that we continue to give you at least the same level of support for your Portable Computer as we always have. Actually, I see that level of support growing due to the expanded market that is beginning to come about from the Portable and with the addition of the 2000.

No. We are not just adding another computer, replacing a vertical market magazine with a more horizontal one. We do believe that the 2000 and the Portable go together, complement each other, and, in many ways, form the ideal system for the most professional computing power available (at the least cost) both at the office and on the road.

I am excited about the innovative things we are doing with PCM. I hope that you will agree that it offers a vast resource for you and your computing needs.

— **Lonnie Falk**

# Letters



## OF MICE AND MEANING

*Editor:*

I work in Japan, and recently I bought and avidly read all the back issues of your excellent magazine. I notice that the Model 100 applications you describe are sharply divided into two categories: (a) the Mickey Mouse ones, just somebody trying to justify his new toy to his wife (although Walt Disney Productions is a billion-dollar enterprise, and their major character should not be so easily taken for naught), and (b) really serious and meaningful applications, that use the Portable Computer for new purposes, many of which were just not amenable to computer treatment at all till the first really usable battery powered portable came along.

In your first editorial you said "we are an independent magazine . . . we are not sponsored . . . we have no ax to grind with any company, and that includes Radio Shack . . . Yes, we probably will get into some of the other portables. We find that many of the applications are similar." In view of this, I am somewhat surprised that no substantial mention at all of the NEC PC-8201 has appeared in any of your issues, except to stigmatize it as "a Model 100 look-alike . . . made by the same company, Kyocera, as produced the M100."

Your readers ought to be told that the most important features of the PC-8201, which I own and use, do not "look alike" the M100 at all. First — better — it comes with up to 64K, not 32K which is the maximum for your machines. That is a gigantic difference: 9,000 words instead of 4,500! Only 32K at a time is visible, though, because it is bank-switched. Second — yet better — it has optional 32K plug-in RAM cartridges that fit into a system slot on the side, so the effective memory can be extended indefinitely, again in 32K segments or 4,500 words visible at a time. Third — worse — it has no built-in modem. This is a disadvantage, especially in the USA, but I notice, reading your articles, that devoted modem-users seem to carry the acoustic cups round with them anyway; so it may not be all that bad. The Model 100's built-in modem is only 300 Baud anyway.

The software for the machines appears from reading your magazine to be almost identical, except that the PC-8201 BASIC appears richer, no doubt because the PC doesn't have *ADDRESS* and *SCHEDL*, both

of which appear to me to be of doubtful utility, especially if one isn't going to use the auto-dialing. The cursor keys on the PC are better laid out.

Anyway, I think you would be doing your readers a service if you were to present a more all-around picture. No other portable at all comparable to these two machines is on the market yet — the Epson HX-20 doesn't come close in terms of utility — but when the next one is available, and turns out to be better than both the Model 100 and the NEC, I think we should at least be told!

By the way, I have seen many of your readers complaining about the bulk and weight of the cassette recorder for back-up storage. I have been using a tiny microcassette recorder for storing programs and data, and have had no trouble at all. The funny thing is, I went to Akihabara here in Tokyo — this is electrical heaven, beside which New York's 32nd St. (I think this is right) is like a back alley — and I tried all sorts of microcassette recorders out. None of them would work except the Olympus Pearl-corder (non-stereo, of course). That one is fine.

By the way again, if you want a shock, type the following text as a document in *TEXT* mode:

```
JK=NM-PL:IFNM=OTHENNM=-I:  
RETURN
```

and then position the cursor at the start of the document and use the *SEARCH* and *NEXT* keys to find all occurrences of "NM." You will be unpleasantly surprised, I think; I was with the NEC!

Thomas J. Goodey  
Tokyo, Japan

## DELETION ADDITION

*Editor:*

In your Editor's reply to the letter by Terry Clark in the March issue, you didn't quite answer his question about the one word deletion command. I suggest the following: with the cursor on the beginning of the word, press *CONTROL L*, *CONTROL F*, *CONTROL U* (or *F7*, *SHIFT F6*).

I very much appreciated the article on the Disk/Video Interface, because I use my Model 100 as my only computer, and really miss not having the speed, random access, and storage capacity of the disk system. I only hope the price of the unit drops drastic-

ally; although you didn't mention a price in your article, the interface costs (in Canada) \$1,099 — enough to purchase a complete disk-operated computer with a monitor. Radio Shack will have to do a little better, I'm afraid.

Finally, congratulations on a fine magazine whose quality has been visibly improving issue by issue. I enjoy PCM very much, and consider [it] the second-best computer investment I have made (after the Model 100, of course!).

Rev. Neil Parker  
Petitecodiac, N.B., Canada

## CODE KEEPER DEBATED

*Editor:*

This letter is in response to the [product announcement] last month for the password protection program for the Model 100. *Code Keeper* was written by Roby Sherman and sells for \$25. It is a program that does everything that it says it will do, and from that point is flawless. However, one thing it will not do is protect the Model 100 menu from being accessed.

When I pointed out the fact to Mr. Sherman, he said words to the effect that someone would have to know quite a bit about computers to be able to come up with the sequence by which the menu can be accessed. This seemed to be an unsatisfactory answer. However, in all fairness, I should say that the flaw lies not in Mr. Sherman's program, but in the Model 100 itself.

For all practical purposes, *Code Keeper* is a fine program, but it is not worth \$25. I downloaded a program from CompuServe which will afford an equal amount of protection, but lacks the little "bells and whistles."

For those considering the purchase of this program, I feel in all fairness the following should be known: When the Model 100 is turned on, just prior to the running of the IPL program, the Main Menu flashes on the screen. If a *CONTROL-C* is executed at that moment, the program will break and you will enter BASIC with the "OK" prompt. From there, a command of "menu" or a stroke of the "F8" key will bring one directly to the Main Menu. Perhaps Tandy will find a way around this problem; but until then, the PoCo is not inviolable.

R. Caley  
Emerson Computer Services

**Editor:**

Thank you for the opportunity to reply to the letter from Mr. Caley.

*Code Keeper* is designed to serve several purposes, and I feel that it does them quite well, within the limits of the hardware.

We advertise *Code Keeper* as a software padlock for the Model 100, to keep unauthorized persons from accessing the files within the computer, and we feel it does this as well as the lock on an automobile keeps it from being stolen, the lock on a home or office keeps it from being broken into, the lock on a safe protects its contents, or the copy-protect locks on many software disks protect them from being copied.

Nothing is foolproof if the intruder has enough knowledge and the correct tools, and that is what I meant when I spoke to Mr. Caley on the phone. It will keep out a fellow office worker when one is out of their office, or one's children, or the hotel room maid. To quote Mr. Caley in a letter that he posted on CompuServe, "*Code Keeper* will keep out all but the seasoned hacker."

It was originally written for use in my computer and I must say I feel quite safe with it installed. I realize that an avid hacker will find a way around it, or better yet, just cold reset the memory and presto it is gone, and then they could dump the memory to reconstruct the files, just as they steal a locked car in less than a minute, or break into a locked and alarm-wired home or office in moments. Has anyone ever won-

dered why the airlines advocate putting your name both *inside* and outside your *locked* luggage? Because every baggage handler knows how to open those locks in seconds, yet we all lock our luggage, don't we?

I do find objections with the statement that it is not worth \$25. When one figures the cost of a good cassette, the documentation, the folder it all comes in, the packaging and shipping, and the phone calls and time spent with customer support (yes, some purchasers are not experts, and have questions to ask), and the bank credit card fees, there sure is not a very large profit margin on this or any similarly priced software. Of course, free is free, but certainly \$25 is not overpriced for a decent piece of software without bugs and gremlins in it. The young man that wrote it is not trying to become a millionaire, but rather to earn some money towards his college education.

This program also provides identification of the computer owner when the incorrect password is entered, so that if per chance it is lost or left behind somewhere as something this portable can easily be, the finder would be able to contact the owner, and hopefully arrange its return. An additional feature of the program informs the owner if any attempt was made to access the computer by an unauthorized person. Mr. Caley refers to these "bells and whistles," but we consider them as important features of the overall program. After all, the return of a lost com-

puter is nothing to sneeze at.

I must say that Mr. Caley is not very security conscious, nor is he doing other Model 100 owners a favor by spelling out in his letter how the computer's security can be defeated, as this can serve to inform the uninformed, just as published information on how to defeat a combination lock in a school locker room would cause havoc by informing the uninformed, many would try it just for the heck of it.

However, we have just made changes in the program, and will gladly update the programs already sold (before 1/20/84 as those shipped after that date have the mod built in) at *no charge* other than a \$2 fee to cover the cost of repackaging and shipping if the purchaser will return the original cassette to us.

With this mod, we suggest that the program be run before the unit is turned off, and then it will not IPL and therefore the weak spot Mr. Caley refers to will not present itself each cycle as it does now.

If Mr. Caley wishes more security than a software padlock can offer, there is a very good free program available on CompuServe that will encrypt his files, this along with *Code Keeper* will make his Model 100 as secure as any method I am aware of, although for me personally, *Code Keeper* alone does a super job.

**Bob Sherman**  
President  
Sherman Electronics



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# Mastering MS-DOS

—Taking a Long Look at the  
Tandy 2000's 'Super Program'

By Danny Humphress  
PCM Technical Editor

## PART I

*This month we begin a major new series by PCM Technical Editor Danny Humphress.*

*"Mastering MS-DOS" will be an ongoing, thorough investigation into the power and wonder of the Model 2000's sophisticated operating system.*

*From the opening question, "What is MS-DOS?" until you have established a comfortable, working relationship with your computer, you will be expertly guided along the way. We feel "Mastering MS-DOS" will be one of the major educational series you'll find in computing magazines today. We hope you won't miss a single installment.*

**B**ehind every great computer is an operating system. On the Tandy 2000, it's MS-DOS that brings it to life. He who masters MS-DOS has mastered his Tandy 2000. Becoming an MS-DOS master is not a task for the weak-spirited, though. It takes courage, stamina, and the willingness to forge on when the documentation leaves you hanging. Over the course of the next several months, for those of you who feel up to the challenge, we're going to give you a guided tour straight to the heart of . . . The MS-DOS Zone.

Seriously, when compared to other operating systems, MS-DOS is no harder to learn than the rest, and it's certainly less complicated than some for all its power.

This is not a "Getting Started Quickly" course. We're going to start with the fundamentals of using MS-DOS and give you a slow but thorough course in the finer points of using this operating system. For those who've already become comfortable with MS-DOS, bear with us. We don't want to lose anyone along the way.

This month, we're going to learn what an operating system such as MS-DOS does and how it works with the computer. This will give us the foundation for a thorough understanding of this operating system.

### What Is MS-DOS?

The Tandy 2000, like any other computer, is just a combination of components and devices. The disk drives, keyboard, display, and the computer's processor are merely connected together. With no "super program" to get these things working together to achieve a goal, they are useless.

MS-DOS is the "super program." It does the hard, fundamental work that our applications programs don't want to worry with. When we type a character on the keyboard, it's MS-DOS that tells the computer things like "Hey! Someone pressed a key, and I want you to display that character on the first line of the screen." Or, "I need to find a file on the disk drive. Let's look at the disk's directory to see if it's there." MS-DOS is a program that's always working. Whether we're using Multiplan or Accounts Receivable, MS-DOS is down where the action is, doing all the dirty work that the almighty applications programs are too "advanced" to do.

### Devices

To MS-DOS, the Tandy 2000 is like a corporation. As a corporation has an accounting department, a filing department, and an advertising department, your computer has a keyboard department, a display department, a communications department and many others. Each department has its own specialized duties to perform. MS-DOS is the board of directors telling the departments what to do. These departments are called "Devices."

The normal devices on a Tandy 2000 are the disk drives, the console (keyboard and display), the printer port, and the RS-232 port. There are also "logical" devices that don't represent anything physical, but rather they represent special uses of the other devices. There is a "list" device that could be the console, printer, or RS-232 port. And there is the "auxiliary" device that may be set up as any of the other devices. When you give MS-DOS commands,

you tell it which device you'll be using for input and output. If you don't give it a specific device name, it assumes you mean the normal or default device for the particular command.

MS-DOS gives the devices special names. The device names are:

A: First Floppy Disk Drive  
B: Second Floppy Disk Drive  
C: First Hard Disk Drive  
AUX: The Auxiliary Device  
CON: The Console (Keyboard & Display)  
COM: The RS-232 Communications Port  
PRN: The Printer  
LST: The Listing Device

As we can copy files from one disk drive to another, we can copy files from any other device to another, because all devices are equal in the eyes of MS-DOS. We can just as easily copy a disk file to the printer as we can copy it to another disk.

You may be totally lost at this point, but you'll need to have at least a little background on devices before we dive into the depths of MS-DOS. The significance will become clearer to you as we explore further.

#### Disk Files

Just as with a filing cabinet, collections of related information on the computer's disk are called "files." Everything stored on the disk is stored in a specific file. Some files contain programs, others contain data that programs use. Some files, not unlike a hanging file system, contain other files.

We give disk files specific names. For instance, let's say that we have a customer database file. MS-DOS requires that we give this file a name when we create the file (we'll talk about creating files later on). MS-DOS has certain rules that we must follow when naming files. First, no two files in the same directory (read further for an explanation of directory) can have the same name. Filenames consist of a name and an "extension."

The filename can be up to eight characters long and may have any combination of letters and digits and certain special characters (see your MS-DOS manual for a list of the allowed special characters). The extension may contain up to three characters and/or digits and is usually used to specify what type file (program, data, etc.) it is.

The extension follows the name and is separated from it with a period. The following are allowable filenames:

ARMENU.BAS PROGRAM1.PRG  
CUSTOMER.DAT

#### Directories

A collection of files is called a "directory." Most microcomputer operating systems limit you to a single directory on a disk. MS-DOS lets you have an unlimited number of directories on a single disk. This allows you to group related programs and data files together.

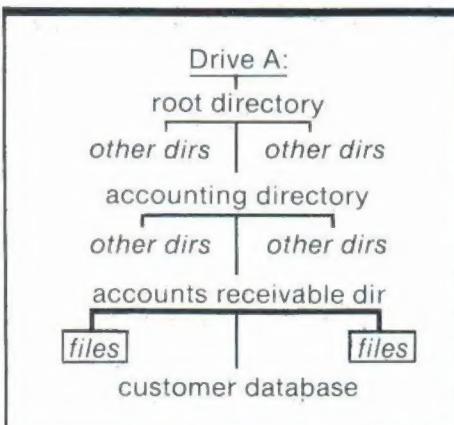
Segregating files in directories, especially on a hard disk, makes it easier and quicker for you (and MS-DOS) to locate a particular file. Because you know that your accounts receivable customer database is in the accounting directory, you don't have to search through all the other unrelated files on the disk to find it.

You can even have directories within directories. Using the above example, you may have a directory with all your accounting programs and files, and within it is a directory specifically for accounts receivable.

Directories on a disk, as with files, can be created and named by you, the user. You may use the same naming conventions you use when naming files except that you do not use a three-character extension. The following are valid directory names:

ADDEPT ACCTNG ARTDEPT  
PROGRAMS

The main directory for the disk is called the "root" directory. All other directories and files are actually a part of the root directory. The above example of the accounting department directory would look like this:



When we are referring to our custom-

er database, we tell MS-DOS the correct "path." In this case, we start at the root directory, go to the accounting directory, then to the accounts receivable directory, and finally to our customer database. This route is called a "path."

MS-DOS has rules about how we give it directions to get to our data. If our accounting directory was called "ACCTNG," accounting's accounts receivable directory was called "AR," and our customer file called "CUSTOMER.DAT," we would use the following to specify a "path" to our customer database if it were on drive A:

A:\ACCTNG\AR\CUSTOMER.DAT

The "A:" device specification tells MS-DOS to look on drive A. The first backslash tells it to start its journey at the root directory. The remaining backslashes separate the directories and the filename. MS-DOS will start in the ACCTNG directory, move into the AR directory (another directory within the ACCTNG directory), and finally find the CUSTOMER.DAT file.

If you were referring to a file in the root directory of drive "A:" called "SAMPLES.BAS," your path name would be:

A:SAMPLES.BAS

If you do not have a hard disk drive, you will most likely not use many levels of directories and sub-directories because of the relatively small number of files you can fit on a floppy disk. With a hard disk drive, however, it becomes important to group like files together to make them easier to get to.

Don't be surprised if you don't grasp all of this yet. When we get to the computer for hands-on work in future MS-DOS tutorials, this will all become clear as a whistle to you. As I mentioned earlier, this series is not designed to get you up and running with MS-DOS right away — the "Getting Started" book that comes with your computer can do that. Our goal is to make you an MS-DOS master. With just the background that you've learned here today, you'll be surprised at how much easier it is to understand the explanations of MS-DOS commands in the reference manual.

In next month's tutorial, we're going to get some practical experience with using directories and files as we learn to use some of the MS-DOS commands. Until then, you can learn and have fun, too, by doing some exploring on your own.

# Let's Go Exploring

By Randy Graham

When I want to learn about a new subject, my favorite strategy is to try to find someone who can explain it to me. There is no substitute for the interactive dialogue where you can keep asking questions for clarification until you fully understand the basic elements of the subject in terms of your present knowledge. There are those times when you want to raise your hand in class, stop the flow of information and get clarification.

If there is no such expert handy, my next favorite strategy is get a book or magazine article on the subject and do the best I can without the interactive aspect. The book or article is probably written by an expert, well-respected in his field. Now, I have a pet peeve about the expert who is pretending to write for novices, but whose main concern seems to be to impress fellow experts with his profundity. The hallmark of this approach is that he starts right in using technical terms: "It is a very simple process involving connecting the gonculator to the infrazzilizer, just taking care not to damage the hyperwoodele circuitry (Fig. 1)." Look, fella, if I knew what you were talking about, I wouldn't be wasting my time on this article!

And so, when I started writing this series on *TELCOM*, I decided to take advantage of my amateur status. What would a fellow like me, smart enough to buy a PoCo but uninformed about telecommunications, want to know to get started? What were the questions I was asking just a short time ago? What help

does someone need if he is not lucky enough to have expert friends around to query?

Out of those questions came a few guidelines. I adopted a chatty, folksy approach which I hoped would minimize the intimidation factor. Just a couple of us old boys sittin' around the cracker barrel talking about things in general. I visualized the reader sitting in his armchair, reading the articles and saying, "Aha, so that's what that means." Maybe doing a little underlining and a few margin notes.

All of this is by way of saying that it is now time to move on. I am going to assume now that you know how to make the most of your end of the telecommunicating process, that you know how to hook up your PoCo, use the *TELCOM* application and get online to a distant service. Latecomers will be referred back to the previous articles.

## At The Other End

For the next phase of your introduction to telecommunicating, I want to take you on a tour of the major information services, one at a time. There is a group of three which are readily available to you. Let's start with them. Taken alphabetically, they are CompuServe, Dow Jones and the Source. That is probably also the order of your familiarity with them. Early on, when Tandy wanted to promote the use of their personal computers as smart terminals, they seemed to have formed a tie to CompuServe which was expanding their services to individuals at the same time. And so, if you buy a modem from Radio Shack, you get an introductory packet to CompuServe at the same time. Later, Dow Jones was added to the packet. Nothing in Radio Shack literature suggests that there are other unmentioned services. And so, as a TRS owner, you probably have heard about these two if any. Let's look in some detail at CompuServe.

## A Big Electronic Place

Now, I immediately run into a dilemma shared by many writers. Taking you to CompuServe is a lot like taking you for the first time to my favorite department store or huge shopping mall and trying to show you all the merchandise on every floor. If you don't see it all, you will not appreciate the scope of it all. If you do look at everything, we will never get home for supper and you will be dazed if not dead. Or, imagine walking into the Library of Congress and asking a guide to show you all their books. That is the size of what we are talking about here.

I have seen many writers crack up over this challenge. A common practice is to cop out by saying "We can only give you an overview," or else the writer picks a couple of his favorite features to describe and says vaguely that there is a lot more. If you are not attracted to the features described, you probably turn away from the service with a vague, "... well, maybe someday . . ." But let's give it our best shot. The only advantage I have is that we are going to talk about just one computer, the PoCo, connected to the network.

Do you care that CompuServe is owned by H.&R. Block, or that it is not one giant computer with a zillion phone lines connected to it, but is a bunch of big computers tied together in a network that is invisible to you? All you need to know is that you call one telephone number and you are connected to the whole system. Let's call that number.

You start your relationship to CompuServe with a starter kit that either comes with your modem cable or is bought separately for \$20. It contains a brief user's guide and a sealed packet. If this packet has been opened, do not take it, or return it to the store. The password has been compromised. You should also ask at the local store how you access the system. Numbers change and the guide may be obsolete. Opening the

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(Randy Graham is a rehabilitation counselor working with the handicapped. Personal computing is his hobby; telecommunications one of his favorite activities. He has done freelance information retrieval and is an inveterate user of the major online systems.)

package, you will find an account number and a password. Time to make friends with CompuServe.

Call the appropriate number and log on as previously described. You will be asked for an account or ID number. Type in the one in your packet. You will then be asked to enter a password. Use the one in your packet. This will divert you to a special program which will ask you to register name, address, credit card number, etc. You can then go to the main menu and use your free hour or more. Your access to databases will be limited until your account is established permanently. You do this by signing the contractual agreement in the packet and mailing it in. You can use your temporary password for a week to give them time to get your contract.

Let's pause here for a hint. Decide right now what name you will use and use it consistently. Some use their full legal names as on checks. Others of us use a familiar form. You do not find cute "handles" (like "Bug Killer") on CompuServe. Another quick hint is to change your password as soon as you can, following instructions. Choose something you can always remember without thinking about it. *Do not write it down and stick it on your PoCo!* Do not put it in a memory file in your PoCo! You can lose a lot of money that way.

Someday, we must talk about security but for now, protecting your account is up to you. Tell anybody who wants to know your ID number. It will be added automatically to all messages and the whole world can read it. If you want to send me EMAIL, address it to Randy Graham, 70015.434. No one can logon in my name with that information (and charge connect time to my account). But please do not tell anyone that my secret password is "Maharg-Ydnar" or my credit card can be in a lot of trouble.

Okay, we are inside CompuServe. Where are we? CompuServe is completely menu driven. That means that you start with a list of choices which you make by entering the number of the choice. This will probably take you to another menu. You will go through several before you actually get to where the beef is. One general problem with the menus is that you do not always immediately understand the categories in the menu. For quite a while, I thought "Home Services" was about linoleum and solar heat and that "Personal Computing" meant programming. Don't worry; familiarity breeds familiarity.

Another problem you may experience

with your PoCo is the eight-line screen. Most of CompuServe's pages are set up for 16 lines. You have two resources — well, three now. If you have invested in the new disk/video interface, you can put the whole page on the screen. I have seen that thing, but I am going to pretend it does not exist because it cuts down on the portability which is PoCo's beauty. An earlier suggestion was to hook up your printer and use the ECHO function in *TERM*. This also cuts down on portability but does have that "look-back" feature which is helpful. I think everyone ought to have one of those small, lightweight printers to go with your PoCo. A new feature is now offered by CompuServe. In March, they implemented a new *DEFALT* program which allows you to set your own parameters. You can specify 40 character lines and seven or eight lines per page. Very neat and handy for us PoCoers. If you go to the *DEFALT* program, do not worry about the other parameters; PoCo fits them very neatly.

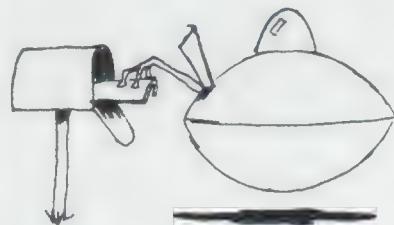
Time to look at the main menu — and time for the cop-out. My version is to urge you to plan to spend some time exploring. A few guideposts: Home Services includes the games section, one of CompuServe's strengths. Sub-menus will allow you to choose board games, parlor games, Adventures, etc. Board games may not work on PoCo — the instructions will tell you what size screen is required. Have you tried any of the Adventure games, where you try to find your way through caverns and castles to find treasures? CompuServe has a good collection. One of the greatest type of games are the real-time spacewar games where you can actually play against other CompuServers.

Here and in a few other places, you will find a \$ before some choices. This means that a surcharge is levied while you are using it. A footnote tells you how much.

Another big popular feature of CompuServe is its SIGs, their name for "Special Interest Groups." A SIG is an electronic club which meets continuously. There are topical SIGs for everything from music to religion to law and medicine. There are also SIGs specific to particular computers. The one you should investigate first is the Model 100 one. Boy, the treasures you have just found!

This SIG, like all of them, have several sections. One is the bulletin board where messages from members are posted. Stop right here. When you first check into the SIG, there is a long

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pause. Then you are asked if you want to be a member. Don't worry — there is no extra charge for joining. The next time you check in, there will be a pause and you will be greeted by name, reminded of the last time you were on, and how many messages await your perusal.

Messages are posted in the order received and numbered sequentially. They do not stay long because of the volume; when the buffer is full, a new message pushes the oldest into oblivion. Typically, the oldest message was posted a week ago. You are free to read all of these messages; there is no privacy here. It may take you an hour to read them all.

There are shortcuts. One is to scan them. This will just give you the headings: sender, addressee, subject and section. Mark the ones you are interested

which allows you to set margins for printing text files so that it is almost a word processor. Another very different one is in the game section (yes, common games adapted to PoCo). It is called *Grandf* and draws a grandfather clock on your screen. It draws on PoCo's TIMES to show the right time. This is what high tech has been building towards! Warning: you will never be the same after getting into the XA databases.

I don't care how late it is getting, we cannot leave the SIG without noticing another of its great features — conferences. Each Thursday night, they have a "speaker" to lead an online discussion on a selected topic. You can ask questions and contribute ideas. Sunday mornings there is an open topic hour. This is real-time telecommunicating and a great growth experience.

Oh yes, there is much, much more to CompuServe — floors we have not even begun to explore. For example, EMAIL is like an electronic first-class letter. It is addressed to an individual by name and ID number and can be read only by that person. Unlike the SIG message board, there is no spooling off; it stays there until the addressee reads it. To use this service, compose your message as a text file before you go online. Choose the FILGE editor function and upload your file. Want to experiment (since you cannot send yourself EMAIL)? Send me a "letter" about this series. As I said, my CompuServe ID is 70015,434. That is the part you must get absolutely right — it is my CompuServe "address."

Oh where is the time to talk about the CB simulator which is about as intellectually stimulating as CB radio but is not limited to line-of-sight or skips? Or the comprehensive index? Or so much more!

Let's see, are there other hints and tips you absolutely must have? Learn the page numbers in the upper right hand corner. Typing "GO PCS-154" at any "!" prompt will take you directly to the M100 SIG, bypassing all menus. "T" at any "!" prompt will take you back to the main menu. If you are working your way through a menu, "N" (for NEXT) will take you to the next item without reprinting the whole menu. USER services on the main menu includes "Feedback," your chance to send a message to the company or to order stuff, etc.

And there is so much more! I haven't told you about the business services — stocks and stuff — or the newswires, or the weather maps you can download, or Comp-U-Store . . . !

I'm sorry, but I'm afraid you'll just have to go exploring.

PCM

*"CompuServe is completely menu driven. That means that you start with a list of choices which you make by entering the number of the choice."*

in reading (this is where the printer comes in handy). An even shorter cut is to choose "Quick Scan." This shows you just the titles and the number of replies. Many replies means controversy. Advice: read the instructions and hints to learn these shortcuts and/or purchase the SIG manual. You can also search by section, by subject, or by addressee (like "ALL").

After you have read a message, you can reply to it instantly. You type the message and it is automatically addressed. Like I say, explore some. You will soon realize that you are a full-fledged member of a great big PoCo club. You will get to know people, correspond with them and generally benefit from and contribute to the vitality of the group.

Eventually, you must move on to the other really great feature of the SIG, its library, called the XA function. Here you will find an unbelievable collection of programs free for the downloading. Some of my favorites are *PRINTR*

Transferring files from the orbiting PoCo to 'Mothership 2000' is a bit of digital derring-do which you can easily master with the right software and a few keystrokes

## 'Beam Me Up, Scotty' (In ASCII, Of Course)



By Danny Humphress  
PCM Technical Editor

While the Tandy 2000 is a marvelous computer, it prefers to do its work in familiar surroundings. It is not the type of computer you would want to take on a business trip or out into the field for recording your inventory of No. 5 Widgets. This makes the Model 100 a logical choice as an intelligent "peripheral" for your Tandy 2000 system.

While the office Tandy 2000 is stationed on its desk doing the larger chores that non-portable computers do, the Model 100 "shuttlecraft" can be out where the action is, doing odd jobs and gathering data for the 2000 "mothership."

And you can have as many Model 100 shuttlecraft as you like, all collecting different information to report back to the Tandy 2000.

Many journalists are already using Model 100s and similar portable computers to do their writing right at the scene of the event while it's fresh in their minds. After editing, they send the draft version off to their publisher's computer by telephone or direct connection for editing and publication. This gives each journalist the convenience of a personal portable word processor.

The Model 100 can also be used to gather data from several different places which can later be combined on a Model 2000 to take advantage of its faster processing speed and mass storage.

To do all these fascinating things, you need a way for the Model 100 to report its data to the 2000. Like most other tasks, this one is simple — if you have the proper tools. The proper tools, in this case, are an RS-232 cable, null modem adapter, and a terminal program for the Model 2000 such as *Videotex Plus*. All of these are available from your local Radio Shack Computer Center or *Plus Computer Center*.

The set-up is quick and easy. For our examples, we'll be using *Videotex Plus*. Connect the null modem adapter, a little device with a cable connector on either end, to the RS-232 connection on

your Model 2000 which is located near the power cable on the lower back side of the computer. Connect one end of the RS-232 cable to the free connector on the null modem, and the other end to the RS-232 port on the Model 100. You're ready to roll.

Now it's time to power up our two computers, if they aren't already, and load the terminal programs. On the Model 100, you already have the *TEL-COM* communications program built in. Just move the cursor on the menu to *TEL-COM* and press ENTER. On the 2000, you'll need to boot with a backup of your *Videotex Plus* diskette. At the DOS prompt, type VIDTEX and press ENTER.

Next, we'll have to decide how we want the computers to communicate. This is called setting parameters. You won't have to worry about this much. Just keep in mind that the parameters for both computers must match for successful communication. We'll be using 4800 Baud, 7-bit words, even parity, 1 stop bit, and XON/XOFF parameters. Again, don't let this bits and bytes talk throw you.

To set the parameters on the Model 100, press the F3 key, type "77E1E"

(without the quotes) and press ENTER.

On the Model 2000, press BREAK to get to the *Videotex Plus* menu, and select #2 (Set Terminal Functions Mode). You'll see another display showing the current parameters on your Model 2000. Press 'A' to select "Parity" and press 'E' to change the parity to "Even." Press 'D' to select "Baud Rate" and press '7' to select "2400." Likewise, change the "Word Size" to "7," the "Stop Bits" to "1," and the "XON/OFF Enable" to "On." When you're finished, press 'N' to enter the terminal mode.

The file that we're sending to the Model 2000 must be in ASCII format. That is, it must be a ".DO" file. If you created it with *TEXT*, you're ready to go. If it is a BASIC program, you must load it into BASIC and save it using the "A" option after the SAVE command.

On the Tandy 2000, press the F5 (Open RAM) key. This will cause all future communications to be stored in the 2000's memory. Once we've transmitted our file, it is captured in memory and can be saved to the 2000's disk.

Press F4 to enter *TEL-COM*'s terminal mode on the Model 100. Next, press F3 to select the "Upload" function. *TEL-COM* will ask you for the filename

you wish to upload. Enter the name of the file stored in your Model 100's memory that you want transferred to the Model 2000. Once you press ENTER, the file transfer will start. You should be able to see the data coming across on the Model 2000's screen. The excitement begins.

After the transmission is complete, you'll want to close the Model 2000's "RAM buffer" and save its contents to disk. Press F6 to close the buffer and press F8 to save to disk. *Videotex Plus* will ask you for the name of the file. Enter the name that you want to be given to the disk file.

What you do with the data once it's in your Model 2000 is up to you. If it's a word processing file, you may want to load it into *WordStar* or *Microsoft Word* for advanced formatting and printing. If it's a data file, a BASIC program should be able to read it with little problem. If your new file is a BASIC program, it may have to be modified before it will work. BASIC program conversion will be the subject of future articles.

We have docked with the mothership and transmitted the data, Captain. Awaiting further orders . . .

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## Expense Reporting — In Search Of The 'Round Toit'

By Robert Frowenfeld  
PCM Contributing Editor



Keeping track of one's expenses during a business trip is much akin to painting a house. What? Well let me put it this way — it's one of those things that you know you have to do, it's one of those things that man derives little pleasure from, and it's one of those things that you would probably love to forego till you found the increasingly hard-to-find "round toit." This month's "On The Road" program will attempt to take some of the drudgery out of keeping track of your business expenses while you are — you've got it — on the road.

Named EXP.BA, that's short for "expenses," the program is short and sweet and really needs little in the way of description. There are three options in the main menu from which to choose. The first option is for entering your daily expenses. The program will first ask you for the date. This should be entered in a mm/dd/yy fashion. You may leave off the leading "0" for the month and/or day — the program will

insert this for you. Next, EXP will ask you for an account number. Here you have to choose from the six categories: Hotel, Meals, Gas, Telephone, Transportation, and Other. If you wish to view the different categories, option 2 from the main menu will display them for you. Furthermore, if you wish to change the names of your expense categories, all you have to do is change the DATA statement in line 70.

After entering the expense category number, EXP will ask you to type in the amount of the expense. Last (but never least in an expense report) is the description. (Here's where you really have to put on our thinking cap!) Anyhow, once all the information is entered you will be asked if the data is correct. You respond with the appropriate 'Y' or 'N' and you're off and running to storing your expense data.

The data all resides in a text file named EXP.DO (how original) and, as always with our "On The Road" programs, can be easily edited with the Model 100's built-in text editor, TEXT.

I've already described what option 2 is all about — viewing your expense categories. That leaves only option 3. This option will scout your data entries

and summarize each day's expenses by category. This way you can enter several pieces of information for food, and they will all total up in the Food column for that day.

If you want to print each day's expense screen as it appears, just hook up your printer and press the PRINT key above your keyboard. The program will continue to display a new screen of totals for each day of data in your EXP.DO file.

One final note. When entering data for each expense be sure to group all expenses for the same date together. For example, enter all of March 19th's expenses first, then all of March 20th's, etc. Don't mix all the data up going in or it will be a mess coming out. However, if you want to use the handy sorting program that was displayed in our first issue of PCM, you could enter the data in any order, sort it, and then run it through this program. The choice is yours. Just remember, if you do choose to sort it, you must make sure that the sorted data file's name is changed to EXP.DO.

That's all for now, business travelers, time for me to find all those receipts so I can fill out my last expense report before I go . . . "On The Road" again.

### PCM Expense Monitor

1. Enter Daily Data
2. Daily Summary
3. Display Categories
4. End Program
- Select:

### Expense Categories

1. Hotel
2. Meals
3. Gas
4. Phone
5. Trans.
6. Other

Press any key ...

### EXP.DO (sample data file):

"03/19/84", 2, 45.83, "Dinner (just a byte)"
"03/19/84", 5, 17, "Taxi to Airport"
"03/20/84", 1, 35, "RAM/ROM Inn"
"03/20/84", 2, 35.43, "Lunch"
"03/20/84", 4, 14.3, "Phone home"

### Enter Daily Expenses

Date: 03/19/84 Category: Hotel  
 Amount: \$ 45.00  
 Desc.: Compu-Lodge

Entry Correct (y/n):

Daily Totals for: 03/19/84

1 Hotel	45.00
2 Meals	58.33
3 Gas	15.75
4 Phone	0.00
5 Trans.	17.00
6 Other	0.00

Press any key ...

**PCM**

**BAR CODED LISTING**

The listing:

```

1 CLEAR 1000:DEFINT I-N:DEFSTR A,R,U
2 BL$=STRING$(38," ")
5 ES$=CHR$(27):R=ES$+"p":U=ES$+"q":GOTO
35
6 LINEINPUT IN$:X=VAL(IN$):IF IN$<>"" TH
EN Y=ASC(IN$):RETURN ELSE RETURN
35
50 DATA "Enter Daily Data","Daily Summar
y","Display Categories","End Program"
52 FOR I=1 TO 4:READ M$(I):NEXT I
60 KEY 1," "+CHR$(13)
70 DATA "Hotel","Meals","Gas","Phone","T
rans.","Other"
72 FOR I=1 TO 6:READ CA$(I):NEXT I
100 CLS:CLOSE:PRINT@51,"PCM Expense Moni
tor"
105 FOR I=1 TO 4:PRINT@I*40+11,R;I;U
;" ";M$(I)::NEXT I
120 PRINT@295,"Select: ";:A=INPUT$(1):X=
VAL(A):IF X<1 OR X>4 THEN 100 ELSE FX=X
130 PRINT USING "#";X;
140 DN FX GOTO 200,300,600,800
200 'enter daily data
202 OPEN "exp.do" FOR APPEND AS 1
205 GOSUB 400
207 PRINT @292,"Press F1 to Exit";
210 PRINT@128," ";:PRINT@128,"";:
GOSUB 6:IF IN$=" " THEN 100 ELSE GOSUB 5
00:PRINT @280,BL$;
215 IF ER=1 THEN 210 ELSE PRINT@128,IN$:
DT$=IN$;
220 PRINT@149,"";:A$=INPUT$(1):X=VAL(A$)
:IF X<1 OR X>6 THEN 220 ELSE CG=X:PRINT@149,CA$(X);
230 PRINT@168,"";:GOSUB 6:AM!=X:PRINT@168,"$";USING"####.##";AM!;
240 PRINT@208,"";:GOSUB 6:DE$=IN$;
250 PRINT@290,"Entry Correct (y/n): ";:I

```

```

N$=INPUT$(1):IF IN$="N" OR IN$="n" THEN
205 ELSE IF IN$<>"Y" AND IN$<>"y" THEN 2
50
260 'store record
270 PRINT #1,CHR$(34);DT$;CHR$(34);";";C
G;","AM!";";CHR$(34);DE$;CHR$(34)
280 GOTO 205
300 'summarize
305 OPEN "exp.do" FOR INPUT AS 1
310 OD$="":FOR I=1 TO 6:TT(I)=0:NEXT I
315 IF EOF(1) THEN 350
320 INPUT #1,DT$,CG,AM!,DE$
325 IF DT$=OD$ THEN 340
330 IF OD$<>"" THEN GOSUB 900
335 FOR I=1 TO 6:TT(I)=0:NEXT I
340 TT(CG)=TT(CG)+AM!
345 OD$=DT$:GOTO 315
350 GOSUB 900:GOTO 100
400 'display
410 CLS:PRINT@49,R;" Enter Daily Expense
s ";U;
420 PRINT@123,"Date":PRINT@140,"Categor
y"::PRINT@161,"Amount"::PRINT@202,"Des
c."::
430 RETURN
500 'verify date
505 ER=0
510 J=INSTR(IN$,"/"):IF J=0 THEN ER=1:RE
TURN
515 A=MID$(IN$,J+1):K=INSTR(A,"/"):IF K=
0 THEN ER=1:RETURN
520 MM=X:DD=VAL(MID$(IN$,J+1)):YY=VAL(MI
D$(A,K+1))
530 IF MM<1 OR MM>12 OR DD<1 OR DD>31 OR
YY<80 OR YY>86 THEN ER=1:RETURN
540 A$=RIGHT$(STR$(MM),2):IF MM<10 THEN
MID$(A$,1)="0"
550 B$=RIGHT$(STR$(DD),2):IF DD<10 THEN
MID$(B$,1)="0"
560 IN$=A$+"/"+B$+"/"+RIGHT$(IN$,2)
570 RETURN
600 'display categories
610 CLS:PRINT@10,R;" Expense Categories
";U;
620 FOR I=1 TO 6:PRINT@I*40+13,R;I;U;" "
:CA$(I)::NEXT I
630 GOSUB 700:GOTO 100
700 'pause
710 PRINT@290,"Press any key ... ";:A=IN
PUT$(1):RETURN
800 'end
810 CLS:MENU
900 'display daily totals
910 CLS:PRINT@5,"Daily Totals for: ";R;" "
;OD$";";U;
920 FOR I=1 TO 6:PRINT@40*I+8,R;I;U;" "
:CA$(I);TAB(22);USING"####.##";TT(I)::NEX
T I
930 GOSUB 700:IF A$=" " THEN RUN
940 RETURN

```

**PCM**

# Disk Video Interface: A User's Critique

By Bill Stauffer

## — Plus How to Install the D/VI's Second Drive

**S**ince the D/VI uses about 5K of RAM, in which some old program routines also reside, and the memory locations for the video output for the monitor differ from those of the LCD, many programs are not interchangeable.

I have the original versions of Portable Computer Support Group's (PCSG) *BUSINESSPAK+*, *DATA+*, and *SORT-2+* programs. They are outstanding; however, they will *not* work with the D/VI. PCSG has done an excellent job in supporting their users by developing patches for these programs for use with the D/VI. They are now available from PCSG for a very nominal fee. Thanks, PCSG, for your great support!

I have the Skyline *PortaCalc* programs which are also excellent, but do not operate with the D/VI. I have contacted Skyline and they are planning on marketing patches for their programs for use with the D/VI in the near future.

A large majority of more simple programs will operate with the D/VI; however, with the larger size of the video

monitor over the LCD, they should be reworked to take advantage of this feature.

An example of this is my financial program which was published in the February 1984 issue of PCM. I have revised this program to take advantage of the features of the D/VI.

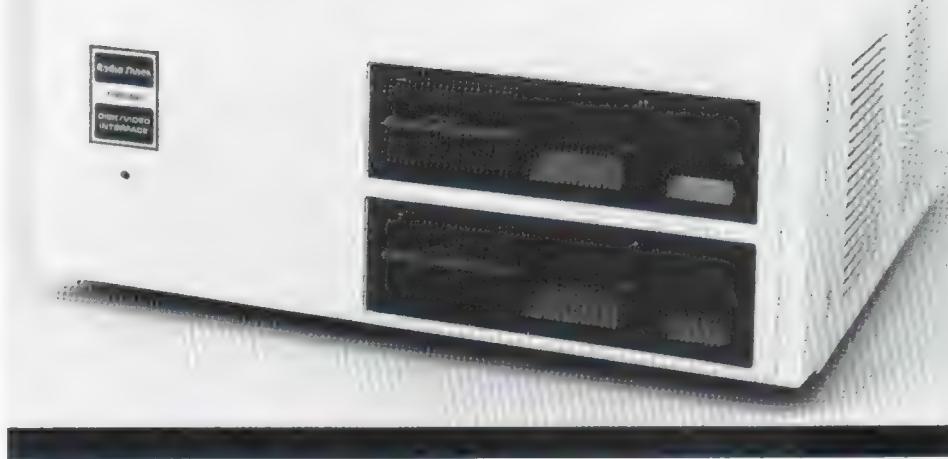
### Installing The Second Disk Drive

Tandy recommends, but does not require, that their service department install the second disk drive in the D/VI. I installed my own and found the job to be quite simple, but I don't advise trying it if you don't have some technical experience. Instructions are not included, so here they are:

- 1) Disconnect power line, video cable, and computer interface cable.
- 2) Remove the four screws, two on each side of the case and carefully remove the top cover.
- 3) Carefully remove the cables from the top of the printed circuit (PC) board on the top right side of the case.
- 4) Remove the PC board ground wire from the chassis of the upper disk drive.
- 5) Remove the four screws from the PC board. **WARNING:** Removing these screws breaks the seals and voids your warranty!
- 6) Carefully lift the PC board and disconnect the flat ribbon cable from the bottom of the board.
- 7) Carefully disconnect the two cables from the disk drive and remove the ribbon cable.
- 8) Remove the four screws that hold the disk drive brackets to the base. A fairly long Phillips screwdriver is required to get to the screw near the power supply shield.
- 9) Carefully remove the disk drive with the brackets attached.
- 10) Carefully "pop-out" the lower disk drive cover. This is attached in three locations, each of which must be broken.
- 11) Unpack the new disk drive.
- 12) Remove the terminal resistors from the old disk drive PC board and install them in the new drive PC board. These resistors are packaged in a single DIP package and are located near the rear of the disk drive PC board and are easily identifiable. The disk drives are identical and the new PC board will have an empty DIP socket.
- 13) Install the new drive in the lower disk drive position and attach using all four screws provided.
- 14) Connect the ribbon connector and power plugs to the lower drive.
- 15) Reinstall and connect the upper disk drive.
- 16) Connect the ribbon cable to the bottom of the PC board.
- 17) Reinstall and connect the PC board. Don't forget to reconnect the ground wire to the upper disk drive chassis.
- 18) **CAREFULLY CHECK ALL OF YOUR WORK!**
- 19) Reinstall the cover.

---

*(William T. Stauffer is an electromagnetic radiation effects projects engineer at the White Sands Missile Range in New Mexico. He has had more than 20 years experience working with computers — eight months with the Model 100 — and has published a number of computer programs and related articles, including one in the October issue of PCM.)*



## Inverse Video

As mentioned above, many users find that inverse video is advantageous by reducing eye strain during extended operation. This is probably due to higher average video intensity as compared to the green, amber, or white on black background. I have noted that when the 80 characters/line mode is used, inverse

video appreciably increases the readability of the display.

A form of this "reversed" video has been incorporated in the M100. This reversal is activated with the BASIC command `PRINT CHR$(27) "p"` and deactivated with the BASIC command `PRINT CHR$(27) "q"`. (NOTE: Lowercase p's and q's must be used.) This

procedure can be used when in BASIC and works with the D/VI monitor; however, when transferring to the *TEXT* mode, the command is automatically negated. Another disadvantage of this form of video reversal is that it operates only with each individual character, resulting in an uneven display.

I have contacted Tandy, and they have not made provisions for true inverse video in the D/VI.

Even so, Tandy has done an outstanding job with their M100 program. The addition of the D/VI has provided us with a complete computer system that has the added advantage of providing portability.

There are a few improvements I would personally like to see added to the D/VI. They include video reversal, as mentioned above; power outlets for printer and video monitor; power source for the M100 computer built into the D/VI; front mounted power switch; improved D/VI to M100 interface cable which would be round rather than flat; and power spike protection. (If it isn't there now!) All in all, I don't see much problem in making any of these modifications for anyone who has a little technical experience.

PCM

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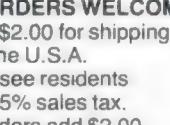
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PCM May 1984

# GOVERNMENT COMPUTER EXPO:

Showtime  
In  
Federal  
City

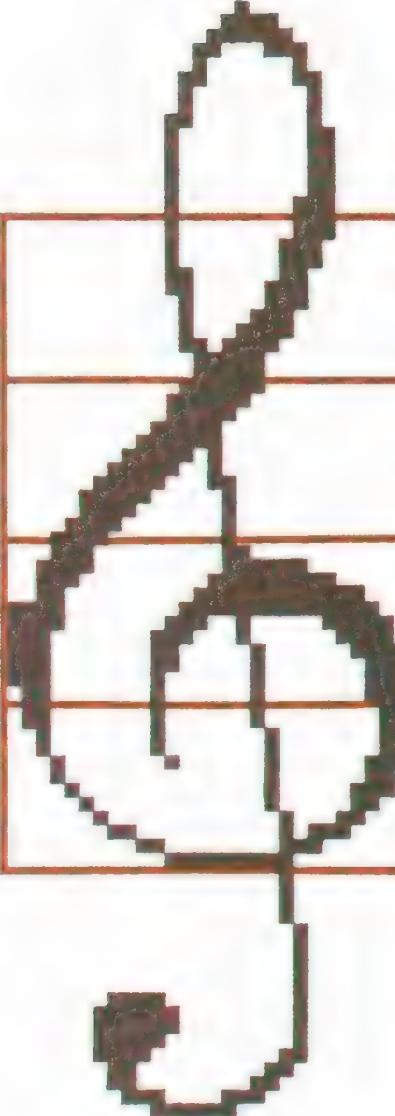
Tandy's highly successful Model 100 will likely be in clear sight at the upcoming Government Computer Expo '84 in Washington June 26-29. And though the Federal city's love affair with the 100 is just beginning, hundreds have already been purchased ("procured") by various agencies . . . some too secret to mention. One we do know about: the U.S. Census Bureau is beginning to use 100s for in-field data gathering as well as statistical analysis back at the office. One employee told me the only problem she has is coming back to the office — everyone wants to use her 100!

Model 100s are the future-tech status symbol (as well as workaday tool) on Capitol Hill — reporters type away on their 100s while hearings are in progress. And committee staff members have also discovered the M100 — using it to not only take notes but to store facts and figures to help them answer members' questions. White House staffers have also been spotted using 100s — sometimes while more expensive "fixed base" computers sit in the background. The upcoming convention at the Sheraton Washington will have two days of seminars, several of them dealing with portables. Wednesday, June 27 will see one panel dealing with "Micros: Portable and Powerful," to be followed by the biggest concern for agencies that handle sensitive data: "Security and Privacy" and the policy implications of hundreds of separate, independent computers. Thursday, June 28, a conference on telecomputing and electronic mail systems will deal with one of the 100's best features as a sophisticated communicating machine.

Besides 200 exhibitors of computer hardware, software, peripherals and services, the Government Computer Expo will offer training for vendors (large and small) on doing business with the government. Since the Model 100 is only one year old, the software and hardware companies supporting it are small but growing fast. Dealing with the government can be a frustrating and time-consuming affair, but also a very rewarding one, too. New procurement regulations, fewer restrictive purchasing rules, and increased spending ceilings have given government agencies more authority in selecting and purchasing those technological innovations which meet their needs. GCE'84 organizers believe that because microcomputers are economical and easy to use, they will lead the move to improve and expand automation of government functions. There are two important facts to keep in mind: 1) federal computer systems are on average seven years old — more than twice the age of those in the private sector, and 2) more than 40 percent of federal buying takes place between July and September. The dollar amounts are staggering: at the General Services Administration's microcomputer store in Washington, sales which averaged \$750,000 per week during September of 1983 plummeted to \$175,000 per week in October. If most of the government's computers are seven years old, \$750,000 wouldn't have been enough to get much more than a single minicomputer back in 1977. But today, a government agency could buy 750 Model 100s with that same amount, and still have money left over for software and peripherals.

(Complete information on Government Computer Expo '84 — U.S. Professional Development Institute, 1620 Elton Road, Silver Spring, MD 20903. Contact Mr. Doug Brooks at (301) 445-4405.)

PCM



# FIVE EASY

By Ken Guscott

There have been several articles recently about writing music to play on the Model 100, and they all have a degree of sophistication that may be unwarranted considering the rather modest capabilities of the machine. However, it is possible for it to make cheerful sounds and, perhaps, a little program which just has a selection of tunes (and doesn't occupy too much memory) might be nice to have.

The strategy used in this program is very direct, and has the advantage of handling repeat passages of music without having to enter the notes more than once. The idea is to use FOR/NEXT loops and DATA/READ statements in a very simple way. The waltz in our program has the following algorithm and you can't get much simpler than this.

```
1 FOR I = 1 TO 69  
2 READ A,B:SOUND A,B  
3 NEXT
```

---

*(Ken Guscott is an engineer engaged in the design of electronic and optical instruments. He holds a bachelor's degree in electrical engineering and designs software primarily for engineering and mathematics applications.)*

It works like this; the loop counts the number of notes in the piece. The READ statement assigns values for the musical pitch and duration to variables A and B. The SOUND statement plays the note and then the NEXT statement increments the counter and we go on to get the next note.

Now the tedious part comes in transcribing the music you want into DATA. But once you've done it you have your tune forever, and it's not much more complex than other programs which have been published. To help in this, we have come up with two tables. The first is an extension of the frequency chart given in the instruction manual for the Model 100. However, this one relates the tones to a piano keyboard and the staves of piano music. With this, it is relatively easy to just take a piece of piano music and read it straight into DATA statements. The second table allows us to figure out suitable duration for various tempos. All we have to do is read the notes from the music sheet and assign pitch and duration. The only other thing we have to do is count the number of notes in each passage and assign that value to the loop counter.

If you refer to the program listing, you will see that both the waltz and the

# POCO FOR PIECES

march are simple loops, and this is because there were no repeat passages in the music. If you look at the hornpipe and the remaining pieces, you will see that they have multiple and/or nested loops to cope with the repeats. Repeats are arranged by RESTOREing the DATA to the start of the passage to be repeated. When transcribing a new piece, it is necessary to analyze the music and then design a suitable loop strategy.

The most complex one is the "Loure" by J.S. Bach. Let's go through it and see how it's done. When we examine the music we find it has the following sequence.

First passage of 56 notes.

Repeat first passage.

Second passage of 133 notes, with a 10-note ending.

Repeat second passage with a different ending.

Third passage of 52 notes.

Repeat third passage.

Fourth passage of 106 notes with a five-note ending.

Repeat fourth passage with a different ending.

Repeat first passage.

Repeat first passage.

Repeat second passage with first ending.

Repeat second passage with second ending.

Well, that's pretty complex, but we can design loops to handle it and our motives are the same as those of the composer. He didn't want to write all those notes over again, either.

The program listings in this article have been arranged so that each piece of music is complete and together. This makes it easier to follow, and allows you to enter and run each one separately if you wish. If you do make each one a separate program, you can MERGE them together later after entering the menu part of the program. Use the command MERGE"RAM:your file-name" and remember that your files must be in ASCII format, then all the tunes will function as one program.

If we look at the listing for the "Loure" we will see that it is far more complex than any other, so if we can understand this one, the others will be easy. Let's go through it line by line. Notice that the loop counter variables are re-used as necessary throughout the program.

400 Remarks

405 Loop K allows the whole piece to be

played twice. Actually, we don't allow that to happen and the piece is ended by the test in line 465 after playing one and a half times.

410 Loop J sets the number of times the first passage will be played.  
415 Loop I counts and plays the notes of the first passage.  
420 DATA is READ into variables A and B and then played.  
425 NEXT increments the I counter. If we exit the I loop then we test J to see if the passage is to be played over. If it is, we RESTORE the data to the beginning of the passage, in this case 2400.

430 NEXT increments the J loop. When we exit the J loop we have finished with the first musical passage.  
435 Sets the J loop for the number of times the second passage will be played.  
440 Sets the I loop to count the number of notes in the second passage.  
445 READ and play the notes.  
450 NEXT increments the I loop. If we exit the I loop then we test the J loop to see which ending is to be used. If it is the first we RESTORE the data to the first ending, 2600, ELSE we RESTORE to the second ending, 2650.

659	622	B
739	698	A
830	783	G
	879	F
987	932	E
1108	1046	D
	1174	C
1318	1244	B
1479	1396	A
1660	1567	G
	1758	F
1975	1864	E
2216	2092	D
	2348	C
2636	2484	B
2959	2793	A
3321	3134	G
	3516	F
3728	3718	E
4433	4184	D
	4697	C
5272	4976	B
5918	5586	A
6642	6269	G
	7032	F
7900	7456	E
8866	8368	D
	9394	C
10544	9952	B
11836	11172	A
	12538	G

455 Sets the I loop to play the appropriate ending.

460 Tests the J loop to see if the second passage must be played over. If so, RESTORE the data to the beginning of the second passage, 2450.

465 NEXT increments the J loop. If we exit this loop, we then test the K loop to see if we are in the second playing of the whole piece. If we are, then this is the place to stop, and we return to the program menu.

470 If the test in 465 indicates that we should continue, then we RESTORE the DATA to the beginning of the third passage, 2500.

475 Sets the J loop for the number of times the third passage will be played.

480 Sets the I loop to count the number of notes in the third passage.

485 READs and plays the notes.

490 NEXT increments the I loop. If we exit it then we test the J loop to see if the passage must be replayed. If so, we RESTORE the DATA to the beginning of the third passage, 2500.

495 NEXT increments the J loop. If we exit it, we go on to the fourth passage.

500 Sets the J loop for the number of times the fourth passage will be played.

505 Sets the I loop to count the notes of the fourth passage.

510 READs and plays the notes.

515 NEXT increments the I loop. If we exit it we test the J loop to find the appropriate ending for the passage. RESTORE to 2700 for the first ending or 2750 for the second.

520 Plays the notes of the fourth passage ending, using the I loop.

525 Tests the J loop to see if the fourth passage should be replayed. If so, it RESTOREs the data to the beginning of the fourth passage, 2550.

530 NEXT increments the J loop and if we exit, RESTOREs the data to the beginning of the piece, 2400. Increment the K loop to return to the start of the piece. Because of the test in line 465, we will not complete the second K loop in the usual manner, but will jump out in the middle.

The only thing left is to describe the menu and selection method used for the program. This is contained in lines 1 through 70. First we print the menu using the statement on lines 1 through 30. Two interesting statements are those employed for getting inverse video.

PRINT CHR\$(27)+"p" gets us into it.

PRINT CHR\$(27)+"q" gets us back again.

These commands are not in the manual. Lines 35 through 70 set up a loop looking for a key to be selected. Don't forget to depress CAPS LOCK or it won't recognize your selection. To select a tune just press the letter shown on the menu. This is a neat way of setting up a menu selection in a program. After each selection is played, the program returns to this menu. If you want to go back to the main menu, press 'M'.

One more hint on transcribing the music. If you want to make a rest, select as though to play a note of pitch 0 and of the duration of the rest. This pitch is too high for us to hear so it sounds like a blank interval. This method of getting a rest is an empty loop. This is used on line 240 of the hornpipe.

Now, if someone would invent a way of making the 100 play more than one voice, we would really have something.

### Tempo

Grave	160	80	40	20	10	5	2-3
Largo	144	72	36	18	9	4-5	
Adagio	128	64	32	16	8	4	2
Andante	104	52	26	13	6-7	-	-
Moderato	80	40	20	10	5	2-3	-
Allegretto	64	32	16	8	4	2	1
Allegro	56	28	14	7	3-4	-	-
Vivace	48	24	12	6	3	1-2	-
Presto	40	20	10	5	2-3	-	-

These tempos have the best metronome relationship consistent with the necessity of integer values for duration. When a value has two values, it will be necessary to average the notes to get the proper bar length. For example, let us suppose the bar has eight notes and the table shows the values 3-4. Then the correct bar length is 28. We can make this sound reasonable if the eight notes have the durations 4,3,4,3,4,3,4,3 which adds up to 28.



1 CLS:DEFINT A-Z:PRINTCHR\$(27)+"p";:PRIN  
T"Five Easy Pieces":PRINTCHR\$(27)+"q";

5	PRINT"Emperor Waltz	W
10	PRINT"Marching Through Georgia	G
15	PRINT"Fishers Hornpipe	H
20	PRINT"Arkansas Traveler	A
25	PRINT"Loire (J. S. Bach)	L
30	PRINTCHR\$(27)+"p";:PRINT"Menu	

M

35 A\$=INKEY\$  
40 IF A\$="W"THEN RESTORE 2000:GOTO 100  
45 IF A\$="G"THEN RESTORE 2100:GOTO 150  
50 IF A\$="H"THEN RESTORE 2200:GOTO 200  
55 IF A\$="A"THEN RESTORE 2300:GOTO 300  
60 IF A\$="L"THEN RESTORE 2400:GOTO 400  
65 IF A\$="M"THEN MENU  
70 GOTO 35  
100 'Emperor Waltz, J. Strauss  
110 FOR I=1 TO 69  
120 READ A,B:SOUND A,B:NEXT  
130 GOTO 1  
150 'Marching Thru' Georgia  
160 FOR I=1 TO 88  
170 READ A,B:SOUND A,B:NEXT  
180 GOTO 1  
200 'Fishers Hornpipe  
210 FOR I=1 TO 2:FOR J=1 TO 62  
220 READ A,B:SOUND A,B:NEXT  
230 IF I=1 THEN RESTORE 2200:NEXT  
240 FOR J=1 TO 20:NEXT  
250 FOR J=1 TO 59  
260 READ A,B:SOUND A,B:NEXT  
270 GOTO 1  
300 'Arkansas Traveler  
310 FOR I=1 TO 2  
320 FOR J=1 TO 44:READ A,B:SOUND A,B:NEXT  
330 IF I=1 THEN RESTORE 2300  
335 NEXT  
340 FOR J=1 TO 20:NEXT  
350 FOR I=1 TO 2  
360 FOR J=1 TO 54:READ A,B:SOUND A,B:NEXT  
370 IF I=1 THEN RESTORE 2330  
380 NEXT:RESTORE 2300  
390 FOR J=1 TO 44:READ A,B:SOUND A,B:NEXT  
399 GOTO 1  
400 'Loure by J S Bach  
405 FOR K=1 TO 2  
410 FOR J=1 TO 2  
415 FOR I=1 TO 56  
420 READ A,B:SOUND A,B  
425 NEXT I:IF J=1 THEN RESTORE 2400  
430 NEXT J  
435 FOR J=1 TO 2  
440 FOR I=1 TO 133  
445 READ A,B:SOUND A,B  
450 NEXT I:IF J=1 THEN RESTORE 2600 ELSE  
RESTORE 2650  
455 FOR I=1 TO 10:READ A,B:SOUND A,B:NEXT  
460 IF J=1 THEN RESTORE 2450  
465 NEXT J:IF K=2 THEN GOTO 1  
470 RESTORE 2500  
475 FOR J=1 TO 2  
480 FOR I=1 TO 52  
485 READ A,B:SOUND A,B  
490 NEXT I:IF J=1 THEN RESTORE 2500

495 NEXT J  
500 FOR J=1 TO 2  
505 FOR I=1 TO 106  
510 READ A,B:SOUND A,B  
515 NEXT I:IF J=1 THEN RESTORE 2700 ELSE  
RESTORE 2750  
520 FOR I=1 TO 5:READ A,B:SOUND A,B:NEXT  
525 IF J=1 THEN RESTORE 2550  
530 NEXT J:RESTORE 2400:NEXT K  
2000 'Data for Emperor Waltz by J. Strauss  
2010 DATA 3728,20,3134,30,6269,10,3516,6  
0,3728,20,6269,20,3728,20,4184,60,3516,2  
0,2792,30,6269,10,3134,60,3516,20,6269,2  
0,3516,20,3728,60,3728,20,3134,30,6269,1  
0,3516,60,3728,20,5586,20,3728,20,4184,6  
0,2792,20,2348,30,3134,10,2488,40,2792,2  
0  
2020 DATA 3134,20,3516,20,4184,20,4696,6  
0  
2030 DATA 2348,20,1864,40,1864,20,2488,4  
0,2488,15,2092,5,2092,20,2092,20,2780,60  
,2488,20,2092,40,2092,20,2792,40,2780,15  
,2348,5,2348,20,2348,20,3134,60  
2040 DATA 2348,20,1864,40,1864,20,2488,4  
0,2488,15,2092,5,2080,20,2080,20,2792,60  
,1758,20,1864,30,2488,10,2092,20,2348,30  
,2792,10,2792,40,3134,20,4696,40  
2100 'Data for Marching Through Georgia  
2110 DATA 2488,15,2792,5,3134,10,2792,10  
,2488,10,4194,10,4194,10,4194,10,3728,15  
,3320,5,3134,10,2792,10,3134,40,4968,15,  
4796,5,4194,10,4194,10,3728,10,4194,10,3  
728,10,3134,10,2792,15,2994,5,2792,10,24  
88,10,2792,40  
2120 DATA 3134,10,3134,10,2792,10,2488,1  
0,2348,10,3728,10,3728,10,3728,10,4184,1  
5,3134,5,3134,10,2792,10,2488,40,2792,20  
,2792,15,2792,5,2792,20,2488,10,2792,10,  
3134,40,3134,40  
2130 DATA 2488,10,2092,30,2488,10,2092,3  
0,2488,10,3134,15,3134,5,3134,10,3728,10  
,3134,30,2488,10,2092,30,2488,10,2092,30  
,2488,10,2792,15,2792,5,2792,10,2488,10,  
2792,40  
2140 DATA 3134,10,3134,10,2792,10,2488,1  
0,2348,10,3728,10,3728,10,3728,10,4184,1  
0,3134,10,3134,10,2792,10,2488,40,2792,2  
0,2792,15,2792,5,2792,20,2488,15,2792,5,  
3134,40,3134,10  
2200 'Data for The Fisher's Hornpipe  
2210 DATA 3134,5,2793,6,2484,5,2348,8,31  
34,8,3718,8,3134,8,3516,8,2793,8,3134,8,  
3516,8,3718,8,4697,8,3718,8,4697,8,3516,  
8,2793,8,3134,8,3516,8,3718,8,4697,8,371  
8,8,4697,8,3516,8,4184,8,3516,8,4184,8  
2220 DATA 3718,8,4697,8,3718,8,4697,8,41  
84,20,3134,5,2793,6,2484,5,2348,8,3134,8  
,3718,8,3134,8,3516,8,2793,8,3134,8,3516  
,8,3718,8,4697,8,3718,8,4697,8,3516,8,27

93,8,3134,8,3516,8,3718,8,3134,8,2348,8,  
 1864,8,1864,8,2092,8,2348,8  
 2230 DATA 2484,8,2348,16,1864,16,2348,16  
 2240 DATA 2484,8,2348,8,2092,8,2484,8,31  
 34,8,2484,8,2092,8,2484,8,1758,8,2092,8,  
 1864,8,2348,8,3134,8,2348,8,1864,8,2348,  
 8,1567,8,1864,8  
 2250 DATA 2092,8,2484,8,3134,8,2484,8,20  
 92,8,2484,8,1758,8,1864,8,2092,8,2348,8,  
 2484,8,2793,8,3134,16,3134,16  
 2260 DATA 2793,8,3516,8,4697,8,3516,8,27  
 93,8,3516,8,2348,8,2793,8,3134,8,3718,8,  
 4697,8,3718,8,3134,8,3718,8,2348,8,3134,  
 8,2793,8,2348,8,2484,8,2793,8  
 2270 DATA 3134,8,3516,8,3718,8,4184,8,46  
 97,16,2348,24,2348,24  
 2300 'Data for The Arkansas Traveler  
 2310 DATA 3134,12,2348,6,1864,6,2092,6,2  
 348,6,2792,12,2792,12,3134,12,3134,12,23  
 48,12,2348,12,2092,12,2092,12,1864,12,18  
 64,12,2092,6,1864,6,2092,6,2348,6,2792,1  
 2,3134,12  
 2320 DATA 2348,6,1864,6,2092,6,2348,6,27  
 93,12,2793,12,3134,12,3134,12,2348,12,23  
 48,12,1174,6,1244,6,1174,6,1567,6,1396,6  
 ,1174,6,1567,6,1758,6,1864,6,2348,6,2092  
 ,6,2484,6,2348,12  
 2330 DATA 1864,6,1758,6,1567,6,1758,6,18  
 64,6,1567,6,1758,6,1864,6,2092,6,1758,6,  
 1864,6,2092,6,2348,6,1864,6,2092,6,2484,  
 6,3134,12,2348,12,2348,12,2092,12,2092,1  
 2,1864,12,1864,12,2092,12,1864,6,1758,6,  
 1567,6,1758,6,1864,6,1567,6,1758,6,1864,  
 6,2092,6,1758,6  
 2340 DATA 1864,6,2092,6,2348,6,1864,6,20  
 92,6,2484,6,3134,12,2348,6,2484,6,2348,6  
 ,3134,6,2793,6,2348,6,3134,6,3516,6,3718  
 ,6,4697,6,4184,6,3134,6,4697,12  
 2400 'Data for Loure by J.S.Bach  
 2410 DATA 2484,8,2348,8,2092,16,3134,8,3  
 321,8,3134,16,1567,16,1660,3,1567,3,1660  
 ,4,1567,3,1660,3,1864,8,1660,8,2092,16,2  
 793,8,2484,8,2348,16,3321,8,3718,8,3321,  
 16,2092,16,2348,8,2484,8,2793,8,2484,8,3  
 134,16,1567,8,1660,8  
 2420 DATA 1864,8,1660,8,1567,8,2092,8,22  
 16,8,1660,8,1567,8,2484,8,2793,8,1660,8,  
 1567,8,3134,8,3321,8,2793,8,2216,8,1864,  
 8,1396,16,1660,8,2092,8,2793,16,2216,16,  
 2092,16,0,4,5586,4,0,12,8368,4,0,12  
 2450 DATA 1660,8,1567,8,1396,16,1660,8,2  
 092,8,2348,16,1660,16  
 2455 DATA 2484,8,2092,8,1567,8,1396,8,12  
 44,16,1567,8,1975,8,1864,16,2348,8,1864,  
 8,2793,8,1567,8,1660,8,1864,8,2484,8,186  
 4,8,1975,8,2216,8,2484,16,1660,8,2484,8,  
 1567,8,1864,8,1975,8,1864,8,1660,8,2484,  
 8,1567,8,2484,8,1396,8,1660,8,1864,8,166  
 0,8,1567,8  
 2460 DATA 2484,8,1396,8,2348,8

2465 DATA 2484,8,1244,8,1660,8,1567,8,24  
 84,16,1864,8,1975,8,1864,16,4976,4,0,12,  
 7456,4,0,12,1864,8,1660,8,1567,16,2216,8  
 ,2484,8,2216,16,2793,16,4184,8,2793,8,15  
 67,8,1864,8,1660,16,2092,8,2348,8,2484,8  
 ,2092,8,1567,8,2484,8,2793,8,1174,8,1244  
 ,8,1567,8  
 2470 DATA 1396,8,1567,8,1660,8,1864,8,20  
 92,16,1660,8,1567,8,1396,8,1660,8,2092,8  
 ,1864,8,1660,8,2092,8,2793,8,2484,8,2348  
 ,8,2793,8,3321,8,3134,8,2793,8,3321,8,41  
 84,8,2092,8,2484,8,3134,8,4184,8,2092,8,  
 2484,8,3134,8,4184,8,1567,8,2092,8,2484,  
 8,2348,8,2793,8  
 2475 DATA 2484,8,3134,8,4184,8,2484,8  
 2480 DATA 2793,8,2484,8,2348,8,3134,8,33  
 21,8,2484,8,2348,8,3718,8,4184,8,2484,8,  
 2348,8,4697,8,4976,8,4184,8,3321,8,2793,  
 8  
 2500 DATA 1567,8,1396,8,1318,16,1396,8,1  
 567,8,1660,16,1567,16,1396,8,1567,8,1660  
 ,8,1975,8,2092,8,2348,8,2636,8,2793,8,31  
 34,8,2092,8,2348,8,2636,8,2793,8,2348,8,  
 2636,8,2793,8  
 2505 DATA 3134,8,3321,8,3134,8,2793,8,26  
 36,8,2348,8,2092,8,1975,8,1758,16,1975,8  
 ,2092,8,2348,16,2636,16,2793,8,2636,8,23  
 48,8,2092,8,1975,8,1758,8,1567,8,1396,8,  
 1318,16,1396,8,1567,8,1758,8,1975,8,2092  
 ,8,2348,8,2636,64  
 2550 DATA 2636,8,2348,8,2092,16,2092,8,2  
 348,8,2092,16,1864,16,1758,8,1864,8,1758  
 ,8,1567,8,1758,16,2348,16,2092,8,1758,8,  
 1864,8,1758,8,1567,8,1758,8,1864,8,2092,  
 8,2092,8,2216,8,2484,8,2216,8,2793,16,13  
 96,8,1567,8  
 2555 DATA 1396,16,2636,8,2793,8,2636,16,  
 2092,16,1567,8,1660,8,1567,8,1396,8,1318  
 ,16,1396,16,1567,8,1758,8,1864,8,2092,8,  
 1758,8,1864,8,2092,8,2216,8,2092,16,5586  
 ,4,0,12,8368,4,0,12,2092,8,1975,8  
 2560 DATA 1758,16,1975,8,2092,8,2348,8,2  
 484,8,2348,8,2092,8,1758,8,1975,8,2092,8  
 ,2348,8,1396,32,1396,8,1660,8,1567,8,139  
 6,8,1318,8,1396,8,1567,8,1318,8,1396,8,1  
 567,8,1660,8,1975,8,2092,8,2348,8,2636,8  
 ,2793,8  
 2570 DATA 2636,8,2793,8,2348,8,2636,8,20  
 92,8,2348,8,1975,8,2092,8,2092,8,3718,8,  
 3321,8,3134,8,2793,8,2636,8,2348,8,2793,  
 8,2348,8,2636,8,2793,8,3134,8,2636,8,279  
 3,8,3134,8,3321,8  
 2600 DATA 2092,16,2484,8,3134,8,4184,16,  
 3321,16,3134,16,8368,4,0,12,12538,4,0,12  
 2650 DATA 2092,16,2484,8,3134,8,4184,16,  
 1660,16,1567,48,0,4,0,4,0,4  
 2700 DATA 3134,16,8368,4,0,12,12538,4,0,  
 12  
 2750 DATA 3134,48,0,4,0,4,0,4,0,4

We've built a better bar code reading program which you can either type in or scan into memory with last month's version.

# The Revised Reader

By Danny Humphress

PCM Technical Editor

Many of you had your first taste of bar code delights last month, and you're craving more. As we promised, we're continuing our commitment to Bar Code BASIC this month with a few new encoded programs and a new and improved bar code reading program.

Some of you experienced difficulty using the bar code program presented in this past month's issue of PCM. The program is very unforgiving if you lose your place and skip a line, or if you accidentally enter a line twice. The new version not only checks for such human errors, but it even prompts you as to which line you should be scanning. Because the bar code line numbers are actually encoded in the bar code, the program always knows which line you're on and can tell you when you make a boo-boo. If you make a mistake, this smarter program alerts you with a little tune and tells you where you went astray.

The new bar code reader program is so smart that it even knows the name of the program you're reading. The first line of code contains the name of the program. After you scan this line, the program automatically displays the name of the program and opens the file in your Model 100's memory. You should use caution here because any file you have in memory with the same name will be overwritten with the now scanned-in code. We will always let you know what the name of the program is so you can avoid such problems.

Because all future programs will be

published with the program name and bar code line numbers embedded in the code, you must use this new bar code reading program to read the code. Likewise, the new bar code reader program cannot be used to read code designed for the old program.

For those who've already entered the older version that appeared in the April issue, we've printed the new bar code reader program in bar code format. You only have to scan it in. Remember, because the program is published in the old format, you must use the old reader to scan it. It cannot be read with the new program. Once you've read in the new reader program, there is no reason to keep the old scanning program since all future programs will use this new format.

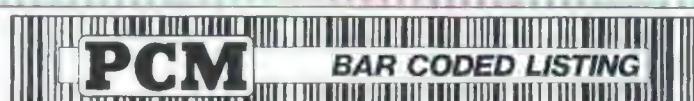
Using the new program is a breeze! When you run it, you will be prompted to scan the first line of code. The program will continue prompting you to enter all subsequent lines until you've scanned the final bar code line. If you've lost your place (we humans are prone to wandering minds), glance at the Model 100's screen to find out which line you

should scan next. A short beep tells you that you're doing fine and can continue to the next line. A lower three-note tune alerts you to problems. If you hear nothing, try scanning the line again. It takes a few times to successfully scan a line, even for us so-called experts.

As I emphasized in last month's article, do not use BREAK to exit this program unless absolutely necessary. If you do press BREAK, immediately type CLOSE:CALL 61807 to close the "WAND" device and reset the machine language subroutine. If you do not do this, it could cause problems in your Model 100 requiring you to totally clear the memory to get things back to normal.

We've reduced the size of the bar code to allow us to print more and larger programs. Use a straightedge, such as a ruler or the edge of an index card to guide your wand across the code.

Please let me know how the new bar code reader is working for you. If you have any brilliant ideas or suggestions about enhancements to or applications for this program, drop me a note.



The listing:

```
10 MAXFILES=2
20 CLEAR 800,61788
30 RUNM"B30F9"
100 CLS
110 PRINT STRING$(40,"-");
120 PRINT "      PCM Bar Code Program De
coder"
130 PRINT STRING$(40,"-")
140 OPEN "WAND:" FOR INPUT AS 1
150 PRINT#212,"Scan First Line"
```

(Danny Humphress, PCM's Technical Editor, is the owner of a computer software and consulting firm in Louisville, Ky. Danny brings to PCM his extensive experience with small business computers and applications software.)

```

160 INPUT#1,S$:GOSUB 1000
170 IF LEFT$(D$,3)<>"001" THEN ER%=1:GOS
UB 3000:GOTO 160
180 FS$=MID$(D$,4,6)
190 OPEN FS$ FOR OUTPUT AS 2
195 PRINT@212,STRING$(15,32);
200 PRINT@132,"Reading: "+FS$
210 LC%=1:PL$="":D$="001"+RIGHT$(D$,LEN(
D$)-9):GOTO 2070
1000 ' *** DECODE STRING ***
1010 D$=""
1020 FOR I=1 TO LEN(S$)
1030   SS$=MID$(S$,I,1)
1040   IF SS$<>"$" THEN 1100
1050   SS$=MID$(S$,I+1,1)
1060   SS$=CHR$(ASC(SS$)+32)
1070   I=I+1
1080   GOTO 1200
1100   IF SS$<>%" " THEN 1200
1110   SS$=MID$(S$,I+1,2)
1120   SS$=CHR$(VAL(SS$))
1130   I=I+2
1200   D$=D$+SS$
1220 NEXT I
1230 RETURN
2000 ' *** READ BAR CODE ***
2010 PL$=""
2020 INPUT#1,S$:GOSUB 1000
2030 L$=VAL(LEFT$(D$,3))

```

```

2040 IF L$-LC%>1 THEN ER%=2:GOSUB 3000:6
0TO 2020
2050 IF L$-LC%<1 THEN ER%=3:GOSUB 3000:6
0TO 2020
2060 LC%=L%
2070 PRINT@280,STRING$(39,32);
2080 PRINT@212,"Scan line ";LC%+1;
2090 FOR I=4 TO LEN(D$)
2100   C$=MID$(D$,I,1)
2110   IF C$=CHR$(13) AND RIGHT$(PL$,5)
="DONE" THEN 2160
2120   IF C$=CHR$(13) THEN PRINT#2,PL$:
PL$="":GOTO 2140
2130   PL$=PL$+C$
2140 NEXT I
2150 GOTO 2020
2160 CLS:CLOSE:CALL 61807:MENU
3000 ' *** ERROR CODES ***
3010 SOUND 5000,10:SOUND 8000,10:SOUND 5
000,10
3020 IF ER%=1 THEN ER$="You must scan li
ne 1 first!"
3030 IF ER%=2 THEN ER$="You've SKIPPED a
line!"
3040 IF ER%=3 THEN ER$="You've ALREADY S
CANNED this line!"
3050 PRINT@280,STRING$(39,32);
3060 PRINT@280+(20-.5*LEN(ER$)),ER$;
3070 RETURN

```

PCM

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*This sequence of mathematical knowledge is . . .*

# Of Prime Importance

By Bob Delbourgo

Prime numbers play a central role in number theory and in the arithmetic of integers (whole numbers). Without the help of prime numbers it is difficult to manipulate fractions systematically and simplify them on occasion. Computers are brilliant at dealing with decimals (see how many digits PoCo will handle in double precision!) but are not geared to the arithmetic of integers, although the MOD function can be of some assistance. The program that follows will allow PoCo to treat integers through the device of primes and factors. It is the first stage of a more ambitious scheme that will let the computer perform arithmetic operations on fractions. I think it should appeal to people with a numerical bent and I am certain that primary (or early secondary) school teachers will find a lot of use for it when setting assignments to their pupils; that is, if the pupils do not also read PCM and have not keyed in the listing below!

Let me first provide a little background. All of you, no doubt, know what a prime number is — a positive integer which is exactly divisible by itself (or 1, obviously) and by no other smaller integer. Some of you will know that any integer can be uniquely expressed as a product of its prime factors. And maybe a few of you will be aware that there is no algorithm (systematic recursive procedure) for "finding the next prime number," if one already knows all primes up to a specified value. Prime numbers have exercised the minds

of number theorists from the earliest days and they are of crucial importance in many branches of mathematics. We shall use the computer to enumerate them and find out more about prime factorization.

The first and vital step is to extract all the primes up to some chosen integer. An ancient and still excellent way to do so originates from the Greek mathematician Eratosthenes, and is called the "Eratosthenes sieve" in his honor. This is how it goes: suppose, for instance, we want to find all primes up to 25, starting from 2 (1 is not counted as a true prime

*"Prime numbers have exercised the minds of number theorists from the earliest days and they are of crucial importance in many branches of mathematics."*

incidentally). Eratosthenes' method consists in writing all the integers from 2 until 25: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25. Then, starting beyond 2, cross off all integers divisible by 2: 2, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25. This proves that 3 is the prime which succeeds 2. The next stage is to strike off all integers beyond 3 which are exactly divisible by 3, as follows: 2, 3, 5, 7, 11, 13, 17, 19, 23, 25. Thus the prime 5 follows 3. Next erase all integers beyond 5 which are exactly divisible by 5 — there is just one to be struck off in this example, namely 25. The process ends here and presto, we remain with all the prime numbers until 25 as the unsieved survivors: 2, 3, 5, 7, 11, 13, 17, 19,

23. It is unnecessary to sieve beyond 5 because any primes larger than 5 must multiply primes smaller than 5, and we have already sifted with them.

You must agree that the sieve is remarkably efficient. However, if one wants to extract all primes up to some large integer (say 100) it is rather a nuisance having to write all the numbers down and strike certain ones out in turn. This is where the mighty micro can relieve us of the drudgery. The first choice in the menu applies Eratosthenes sieve and allows you to enumerate all primes up to some chosen value (which I have arbitrarily set at 1,000 to conserve memory and patience). Actually the title card of the program gives a visual perspective of the sieve in action. The integers from 0 to 239 occur at the respective PRINT locations and the crossing out of prime multiples corresponds to a shading out of the integer position.

The second part of the menu concerns the problem of finding prime factors of any integer; for instance,

$$2520 = 2^2 * 2^2 * 3^2 * 5^1 * 7^1$$

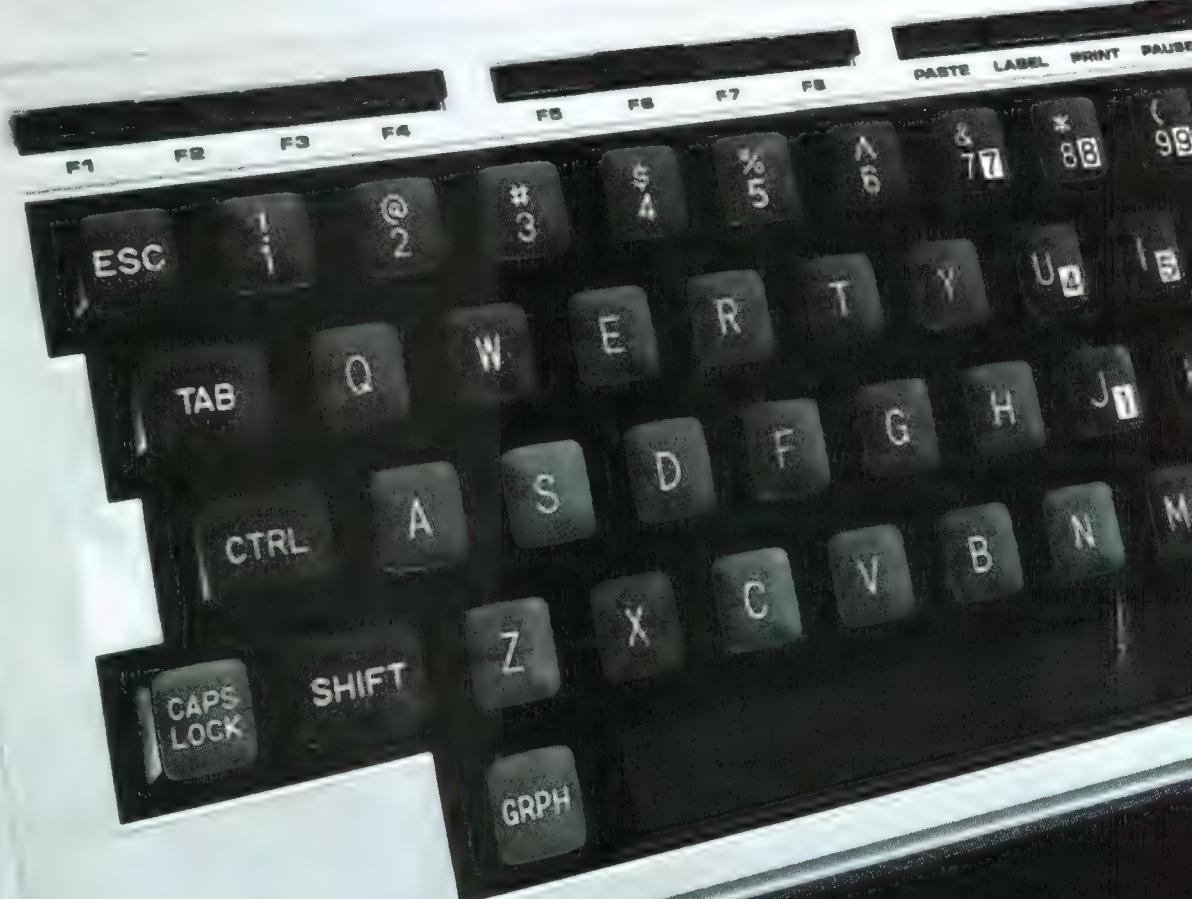
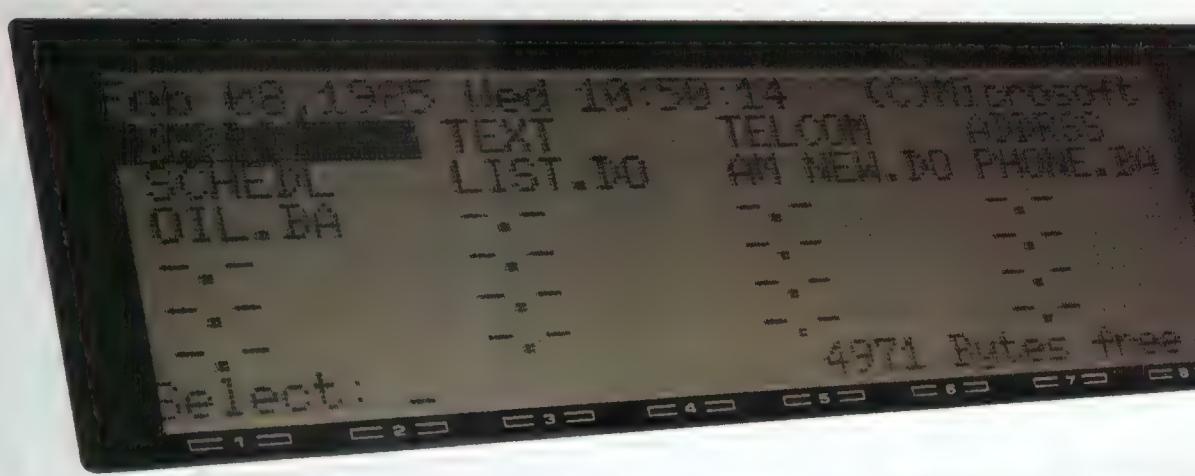
Mathematicians tidy this product to look like

$$2520 = (2^2)^2 * (3^2)^1 * (5^1)^1 * (7^1)^1$$

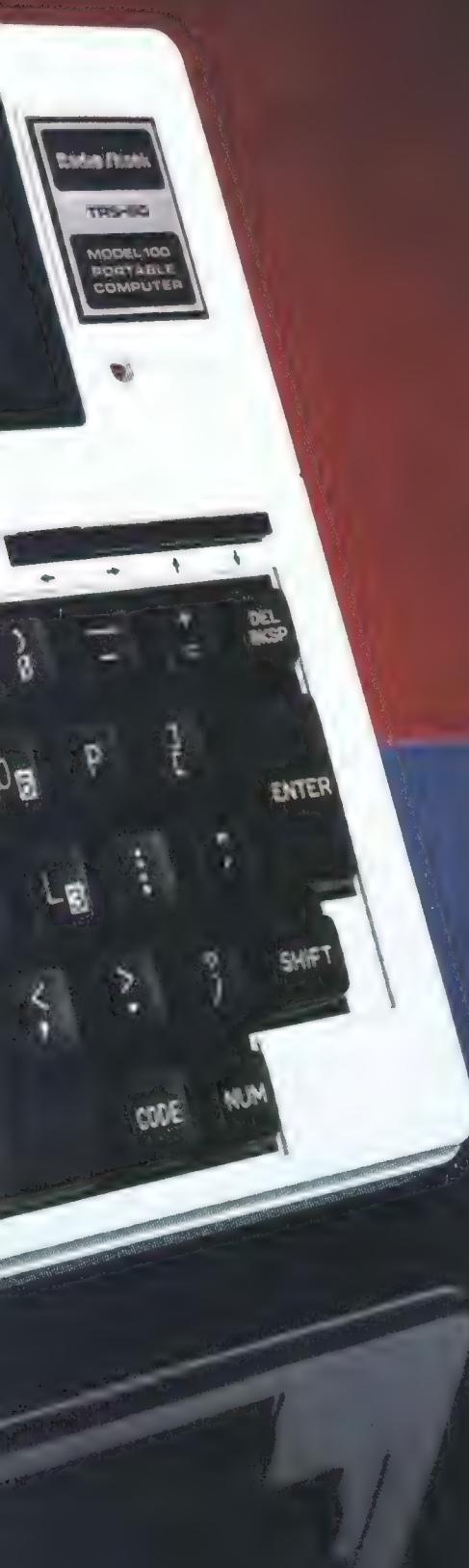
where  $2^3$  signifies  $2 * 2 * 2$ , etc. By the way, the number after the  $\wedge$  is called the "exponent" and the number before the  $\wedge$  is called the "base." In order to compute the prime factors of any number, one need only find primes until the square root of that number (since any higher prime is bound to lead to a smaller quotient and we have already taken care of that). Therefore, without undue delay, it is possible to discover the prime factors of any integer up to

*(Robert Delbourgo is a theoretical physicist by profession. He derives particular pleasure from the graphics side of his computing hobby, which can be used to illustrate vividly many mathematical concepts.)*

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about 1,000,000 (because a facility for cataloguing primes up to 1,000 is built into the program!)

You may use the second menu choice to actually test whether a number is prime or not. For example, you may find which of the series of Mersenne numbers,  $(2^2)-1 = 3$ ,  $(2^3)-1 = 7$ ,  $(2^5)-1 = 31$ ,  $(2^7)-1 = 127$ ,  $(2^{11})-1 = 2047$ ,  $(2^{13})-1 = 8191$ ,  $(2^{17})-1 = 131071$ ,  $(2^{19})-1 = 524287$ , ... is *not* prime. A similar test, applied to the Fermat numbers,  $(2^2)+1 = 5$ ,  $(2^4)+1 = 17$ ,  $(2^8)+1 = 257$ ,  $(2^{16})+1 = 65537$ , ... is inconclusive, I fear.

The third part of the menu flexes PoCo's muscles on more worthy arithmetic. This has to do with the evaluation of the highest common factor (HCF) and the lowest common multiple (LCM) of a collection of integers. You will remember that HCF and LCM are of paramount importance when handling sums and products of fractions. The HCF of the collection of integers is the largest integer that exactly divides into the entire collection, whereas the LCM is the smallest whole number into which the numbers of the collection divide exactly. Knowing the HCF and LCM is the basis of fraction arithmetic, as I have already pointed out. This last

#### The listing:

```

10 CLS:FORI=2TO16:FORJ=2TOINT(319/I)
15 IFI*IJ<>319THENPRINT@I*J,CHR$(255);
16 NEXTJ,I
20 PRINT@94,"PRIME NUMBERS";:PRINT@174,
Bob Delbourgo";:PRINT@280,"15 WILLOWDENE
AV, HOBART, AUSTRALIA7005";
30 FORT=1TO2222:NEXT
40 CLS:LINE(20,13)-(220,49),1,B:PRINT@85
,"(1) ENUMERATION OF PRIMES";:PRINT@1
25,"(2) FACTORISATION TO PRIMES";:PRIN
T@165,"(3) HCF & LCM OF INTEGER SET";
50 PRINT@205,"ENTER CHOICE NUMBER";:INPU
TC:C=INT(C):IFC<0RC>3THEN50
60 ONC GOTO100,200,300
100 CLS:PRINT@6,"ENUMERATION OF PRIME NU
MBERS";
105 PRINT@40,STRING$(40,231);
110 PRINT@80,"Prime numbers up to (MAX.
1000)";:INPUTN:N=INT(N):IFN<20R>1000THE
N110
120 DIMA(N):PRINT"Please wait for them!""
:GOSUB500
130 FORI=1TON:IFA(I)<>0THENPRINTA(I);:BE
EP
140 NEXTI:PRINT:PRINT"    <P> TO PRINT OU
T, <R> TO RESTART";
150 I$=INKEY$
155 IFI$="P"THEN170
160 IFI$="R"THENCLS:RUN40

```

program is especially useful to seventh and eighth graders and should serve as a basis for manipulating fractions without getting entangled with decimals.

Finally let me say a few words about the listing itself since I have not included any REM lines.

Lines 10-60 provide the menu, including the visual version of the sieve.

Lines 100-140 concern prime enumeration and, in this respect, subroutine 500 is absolutely crucial. It forms the array of integers, tests for divisibility by two and succeeding primes (lines 505-520). Note that when divisibility is exact, we set the array value A(K) to zero; and in future, when we come across zero, we ignore that value (line 505), the same as crossing out. *Please give the computer time to work out the answers.*

Lines 170-180 permit you to print out the primes on paper.

Lines 200-220 let you input the integer to be factorized, the subroutine 500 still sifting for primes.

Lines 230-280 are the real nitty-gritty; they let PoCo discover how many times B(I) a particular prime A(I) factors into the number. As already indicated, the remaining quotient,

M, if any, is bound to be prime and is accounted for in line 285.

Lines 300-305 allow you to input the integer collection for finding their HCF and LCM. Please do not introduce too many integers that are excessively large as you may run out of memory.

Subroutine 600-610 is required to find the maximum M of the sieved primes.

Subroutine 900-910 is used later to ascertain the possible common prime quotient >M

Lines 310-315 provide the prime factors of every number you type in.

Lines 317-337 address the problem of the LCM and the subroutine 700 comes in to determine the LCM of the prime quotients, involving a re-ordering of these quotients in ascending order as L(J).

Lines 319-323 treat the remaining prime bases and maximum exponents.

Lines 338-354 tackle the HCF by extracting the prime bases and minimum exponents.

Even if you do not follow all the intricacies of the programming, just play with the selection and regard it simply as a utility. It is actually fun to try out various cases!

```

165 GOTO150
170 FORI=2TON:IFA(I)<>0THENPRINT,A(I);
180 NEXTI:LPRINT:GOTO150
200 CLS:PRINT"FACTORISATION OF AN INTEGE
R INTO PRIMES"
205 PRINT@40,STRING$(40,241);
210 PRINT@80,"Enter integer to be factor
ised";:INPUTR:R=INT(R):IFR>10000000RR<2T
HEN210
215 PRINT@160,"Working it out...";
220 M=R:N=INT(SQR(R)):DIM A(N+1),B(N+1):G
OSUB500
230 FORI=2TON:IFA(I)=0THEN250
235 IFM=A(I)*INT(M/A(I))THENB(I)=B(I)+1E
LSE250
240 M=M/A(I):GOTO235
250 NEXTI
260 BEEP:PRINT@160,"The prime factorisat
ion of"R"is:"
265 FORI=2TON
270 IFA(I)<>0ANDB(I)<>0THENPRINT"(";MID$(
STR$(A(I)),2,LEN(STR$(A(I)))-1);";";MID
$(STR$(B(I)),2,LEN(STR$(B(I)))-1);")";
280 NEXTI
285 IFM<>1THENPRINT"(";MID$(STR$(M),2,LE
N(STR$(M))-1);";";";
290 PRINT:PRINT:PRINT"<R> TO RESTART, <
F> FOR MORE FACTORS.";
295 I$=INKEY$

```

```

296 IFI$="R"THENRUN40
297 IFI$="F"THENRUN200
298 GOT0295
300 CLS:PRINT"      HCF AND LCM OF INTEG
ER SET";
301 PRINT@40,STRING$(40,167);
303 PRINT@80,"How many integers to facto
rise";:INPUTS:S=INT(S):IFS<2THEN303ELSE
IMM(S),R(S)
304 FORJ=1TOS:PRINT"Enter # "J" integer";:
INPUTR(J):R(J)=INT(R(J)):IFR(J)<2THEN304
ELSEM(J)=R(J):NEXTJ:GOSUB600:PRINTSTRING
$(40,241);:PRINT"Press any key to procee
d to next stage";:GOSUB800:PRINT
305 PRINT:N=INT(SQR(M)):DIM(A(N+1),B(N+1,
S):GOSUB500
306 FORJ=1TOS:FORI=2TON:IFA(I)=0THEN309
307 IFM(J)=A(I)*INT(M(J)/A(I))THENB(I,J)
=B(I,J)+1ELSE309
308 M(J)=M(J)/A(I):GOT0307
309 NEXTI,J:GOSUB900
310 FORJ=1TOS:PRINTR(J);="";
311 FORI=2TON
312 IFA(I)<>0ANDB(I,J)<>0THENPRINT"(";MI
DS(STR$(A(I)),2,LEN(STR$(A(I)))-1);";^";M
ID$(STR$(B(I,J)),2,LEN(STR$(B(I,J)))-1);
")";
313 NEXTI
314 IFM(J)<>1THENPRINT"(";MID$(STR$(M(J)

```

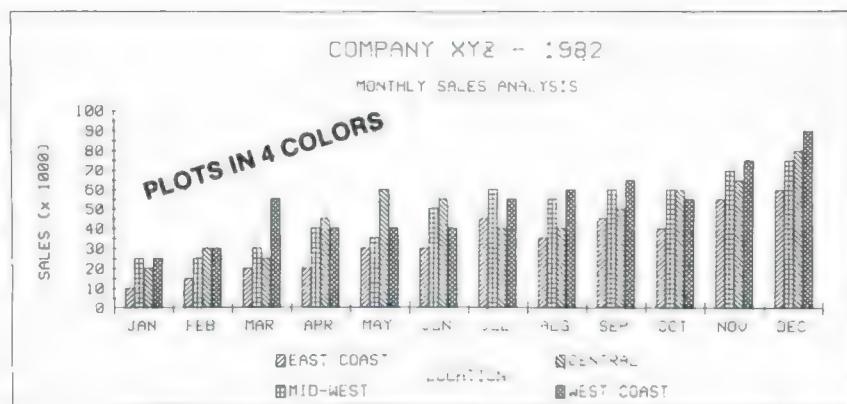
```

),2,LEN(STR$(M))-1);";^1)";
315 BEEP:GOSUB800:PRINT:NEXTJ
316 BEEP:PRINTSTRING$(40,241);:GOSUB800:
DIMC(N+1),L(S)
317 PRINT"The lowest common multiple of"
318 FORJ=1TOS:PRINTR(J);:NEXTJ:PRINT" is
"
319 FORI=2TON:IFA(I)=0THEN323
320 C(I)=B(I,1)
321 FORJ=2TON:IFB(I,J)>C(I)THENC(I)=B(I,
J)
322 NEXTJ
323 NEXTI
324 GOSUB700
325 FORI=2TON:IFA(I)=0ORC(I)=0THEN327
326 PRINT"(";MID$(STR$(A(I)),2,LEN(STR$(A(I)))-1);";^";MID$(STR$(C(I)),2,LEN(STR$(C(I)))-1);")";
327 NEXTI
328 FORJ=1TOS:IFL(J)<2THEN330
329 PRINT"(";MID$(STR$(L(J)),2,LEN(STR$(L(J)))-1);";^1)";
330 NEXTJ
331 L=1:FORI=2TON:IFA(I)=0ORC(I)=0THEN33
3
332 FORK=1TOC(I):L=L*A(I):NEXTK
333 NEXTI
334 FORI=1TOS:IFL(I)<2THEN336
335 L=L*L(I)

```

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```

336 NEXTI
337 PRINT" ="L:PRINTSTRING$(40,241);:BEE
P:GOSUB800
338 DIMD(N+1):PRINT"The highest common f
actor of"
339 FORJ=1TOS:PRINTR(J);:NEXTJ:PRINT" is"
340 FORI=2TON:IFA(I)=0THEN344
341 D(I)=B(I,1)
342 FORJ=2TOS:IFB(I,J)<D(I)THEND(I)=B(I,
J)
343 NEXTJ
344 NEXTI
346 FORI=2TON:IFA(I)=0ORD(I)=0THEN348
347 PRINT"(";MID$(STR$(A(I)),2,LEN(STR$(A(I)))-1);"^";MID$(STR$(D(I)),2,LEN(STR$(D(I)))-1);")";
348 NEXTI
349 IFF>1THENPRINT"(";MID$(STR$(F),2,LEN(STR$(F))-1);"^")";
350 H=1
351 FORI=2TON:IFA(I)=0ORD(I)=0THEN353
352 FORK=1TOD(I):H=H*A(I):NEXTK
353 NEXTI:H=H*F
354 PRINT" ="H
355 PRINTSTRING$(40,241);:PRINT" <R> fo
r menu, <H> for more HCF & LCM.";
356 I$=INKEY$
357 IF I$="R"THENRUN40
358 IF I$="H"THENRUN300

```

```

359 GOT0356
500 FORI=1TON:A(I)=I:NEXTI
505 FORJ=2TOINT(SQR(N)):IFA(J)=0THEN525
510 FORK=J+1TON
515 IFA(K)=A(J)*INT(A(K)/A(J))THENA(K)=0
520 NEXTK
525 NEXTJ
530 RETURN
600 M=M(1):FORJ=2TOS:IFM(J)>M(J-1)THENM=
M(J)
610 NEXTJ:RETURN
700 L(1)=M(1):FORJ=1TOS
701 IFM(J)<L(1)THENL(1)=M(J)
702 NEXTJ
703 FORJ=1TOS:IFM(J)=L(1)THENM(J)=0
704 NEXTJ
705 FORK=2TOS
706 FORP=1TOS:IFM(P)=0THEN708
707 L(K)=M(P):GOT0709
708 NEXTP
709 FORJ=1TOS:IFM(J)=0THEN711
710 IFM(J)<L(K)THENL(K)=M(J)
711 NEXTJ
712 FORJ=1TOS:IFM(J)=L(K)THENM(J)=0
713 NEXTJ,K:RETURN
800 IF INKEY$="" THEN800ELSERETURN
900 F=M(1):FORU=2TOS:IFM(U)=M(U-1)THEN91
0ELSEF=1
910 NEXTU:RETURN

```

PCM

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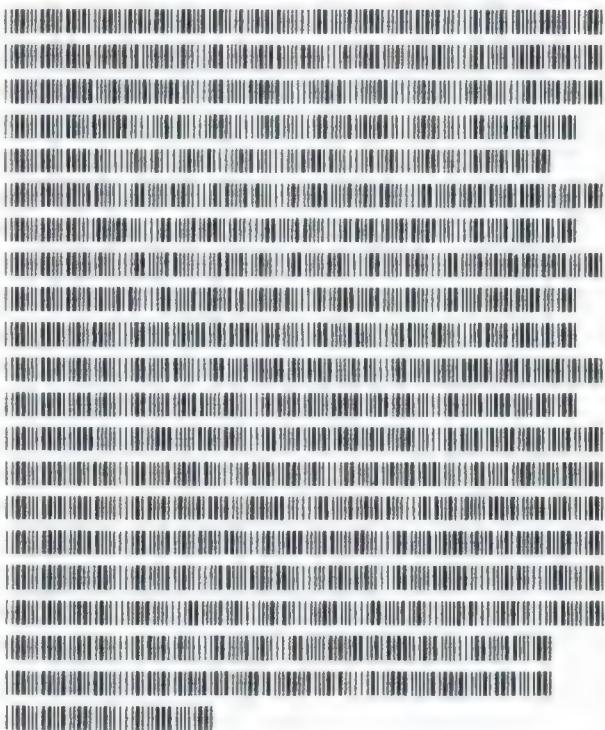
Set the alarm time by entering it in "HH:MM:SS" format when the program asks. When the moment is at hand, you will be notified with a continuous "beep" from your computer. The beeping will continue until you press BREAK to stop the program. One more thing, it's highly recommended that you use your AC adapter for this program. Most batteries would not make it through the night.

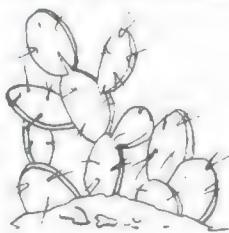
### The listing:

```

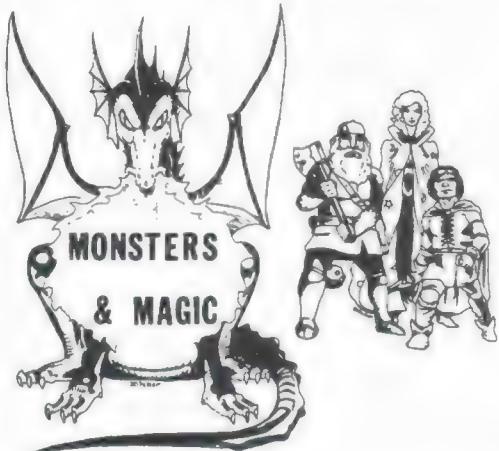
5 CLS:GOSUB 60
10 PRINT"Enter Time To Wake-up:";
20 INPUT A$:IF A$="" THEN RUN
30 IF TIME$<>A$ THEN GOSUB 60:GOTO 30
40 BEEP:FOR I=1 TO 10:NEXT I:GOTO 40
60 PRINT @0,"Time is now: "TIME$:RETURN

```





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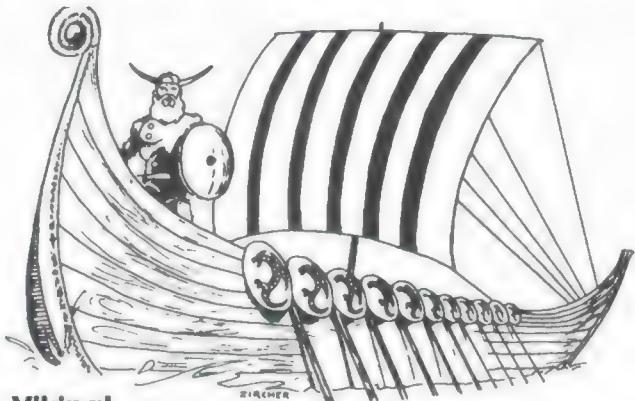
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# Examining BASIC's INSTR Function

By Bill Nolan

*For database or mailing list programs, INSTR's searching capability is extremely powerful*

In this article we are going to examine the INSTR function, looking at both some possible uses and how the function is actually used. Before we start this, however, we need to discuss just what we are talking about when we say "function."

A function is like a little built-in program that is supplied when you buy the computer. Model 100 BASIC has a lot of functions included with it, and all of them work in essentially the same way. All functions do what is called "returning a value." This means that when you call up the function, it will do its job and then give the results of that job back to you. Because of this, you must decide ahead of time what you want to do with the results of a function. Usually you will either PRINT out the results right away, compare the results to something using an IF . . . THEN statement, or store the results in a variable. Functions can be recognized easily because they will start with "PRINT function," or "X=function," or "IF function = argument THEN . . ."

Functions are divided into two types, depending upon the characteristics of the value they return. If the result of the function is a "string" of alphanumeric characters, then it is a string function, but if the result is a number, then it is a numeric function. INSTR is a numeric

function, although it is applied to strings, because the result returned is a number.

The "syntax" or correct form of the INSTR function is:

X = INSTR(start position, search string, target string)

The X at the beginning can be any valid numeric variable name. This is the variable we must provide so the computer will have a place to store the results of the function. The word INSTR is the name of the function, so that's how the computer will know what we are wanting it to do. The information contained inside the parentheses is called the argument of the function, and we will be looking at that in detail in a moment.

The purpose of the INSTR function is to look through a string and find out whether another string is contained inside. For instance, if we have a string "John Smithson," we may want to look through it to see if it contains the smaller string "Smith." Without the INSTR function this would be a tough job, but with this function it's a breeze. The syntax for this is:

X=INSTR(1,"John Smithson",  
"Smith")

Again, the X is where the answer will be stored. The 1 is the start position. Since we have used a 1, the computer knows we want it to start looking at the first character in the search string, so it will start at the 'J' in John and compare the target string (that's the string we are

trying to match) with all of the possible little strings inside "John Smithson." It always compares strings of equal length, so first it will compare "John" to "Smith" and see if they are the same. Since they aren't, it will go on and compare "ohn S" to "Smith," and then "hn Sm" to "Smith." It will continue like this until it gets to the "Smith" in "Smithson," and then it will be comparing one "Smith" to another "Smith," which is a match.

If it finds a match, it will return the number of the first character in the match. In this case, the "S" in the beginning of the word "Smith" inside the string "John Smithson" is the 6th character. Count them . . . "J" is 1, "o" is 2, "h" is 3, and so on. The result of this is that X will be equal to 6. Try typing in this little program and running it.

```
30 X=INSTR(1,"John Smithson",  
"Smith")  
40 PRINT X
```

In actual use, you won't actually use the real words inside the parentheses, you will use variable names instead, like this:

```
10 A$="John Smithson"  
20 B$="Smith"  
30 X=INSTR(1,A$,B$)  
40 PRINT X
```

So, now that we know *how* to use the function, let's look at some practical uses for this very powerful function. The most common use is in database or mailing list programs, as part of a

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search section of the program. Try this short program.

```
10 CLS
20 PRINT
30 INPUT "ENTER THE STRING
YOU WANT TO SEARCH FOR"
;T$ 
40 FOR X=1 TO 15
50 READ M$ 
60 IF INSTR(1,M$,T$) THEN
PRINT M$ 
70 NEXT X
100 DATA JOHN SMITHSON,
MIKE RODGERS,BILL NOLAN,
JANE SMITH,NOLAN RYAN
110 DATA MARY JANE DOE,
DONALD JOHN,RODGER
JONES,PAUL FREDRICKS,JIM
JONES
120 DATA FRED RODGERS,
PAULETTE SMITH,BETH
JOHNSON,BILLY CARTER,DON
DOE
```

When you RUN this you will get some interesting results. Try answering the question with JOHN, SMITH, RODGER, SON, BILL, or FRED. The program will search out all the names with those words anywhere in them and print them out. Try answering the question with a single letter!

Now let's go through the program one line at a time to see how it works.

Line 10 clears the screen. Line 20 prints a blank line on the screen (I find the first line harder to read than the others). Line 30 asks you for a string to search for, and when you enter it, it stores it in the variable T\$. A note is in order here. The computer thinks that capital letters and lowercase letters are unrelated. In other words, it doesn't think that "SMITH" and "smith" are the same thing at all, so since all of my DATA is in capital letters, the target strings you input must be in uppercase also, or no match will be found.

Line 40 sets up a loop to read and compare the data. Why 15? I have 15 pieces of data in lines 100-120. Line 50 reads a name out of the data, and line 60 is why we wrote this program. This line checks to see if a match is found. When you use the IF like this without a logical argument, the computer will check the function to see if it returned a zero or not. (INSTR returns a zero when no match is found.) In this case then, since if a match is found the computer will return a number indicating where it starts, the name will be printed if your

NAME"
60 PRINT "(E)ND THE
PROGRAM"
70 PRINT "PRESS THE LETTER
OF YOUR CHOICE"
80 K\$=INKEY\$: IF K\$="" THEN
80

Now we've printed a menu on the screen and asked the user of the program to press 'A', 'D', 'S', or 'E'. Line 80 will strobe the keyboard until they press a key. Without INSTR we would now need something like this:

```
90 IF K$="A" THEN GOTO ...
100 IF K$="D" THEN GOTO ...
110 IF K$="S" THEN GOTO ...
120 IF K$="E" THEN GOTO ...
130 GOTO 80
```

Line 130 is there in case they pushed the wrong key. This isn't too bad for a short menu, but if there are 12 choices then you will need 12 IF ... THEN statements, and IF ... THENs are slow. Try adding these lines instead.

```
90 M$="ADSE"
100 X=INSTR(1,M$,K$)
110 ON X GOTO LINE,LINE,
LINE,LINE
120 GOTO 80
```

Not only is this already shorter and faster, but if you expand the menu to twelve items, all you have to do is make M\$ longer and add some more lines to line 110. You won't need any more lines at all (except to print the menu on the screen).

Another common use for INSTR is with menus. A menu is just a list of choices, like this:

```
10 CLS
20 PRINT
30 PRINT "(A)DD A NAME"
40 PRINT "(D)ELETE A NAME"
50 PRINT "(S)EARCH FOR A
```

I hope this gets you interested in some uses for this powerful and somewhat neglected function. By the way, you won't find this function on a lot of Brand X computers. If there is interest, we could work on developing a full mailing list with good search capability using INSTR, but that will need to wait for another time.

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*The outstanding graphics capabilities of Tandy's Model 2000 are complemented by the excellent qualities of the highly compatible CGP-220 Ink Jet Printer*

# Those Great (and Colorful) '2000' Graphics!

By Wayne Sanders

Three cheers for the Red, White, and Blue! And three cheers to Tandy for including *CGPDMP.BIN*, the color graphics screen print program for the CGP-220 Ink Jet Printer, with each Model 2000.

When I first saw the Model 2000, it was love at first byte (sorry). If only I could have those beautiful color graphics images on paper! I was aware that Radio Shack's CGP-220 Ink Jet Printer could produce color graphics, but I figured that Radio Shack would not make the necessary machine language program for the Model 2000 for some time. I was pleasantly surprised — astonished, actually — to find the program of my dreams right there on the MS-DOS disk! Someone in Radio Shack heaven must have been thinking of me.

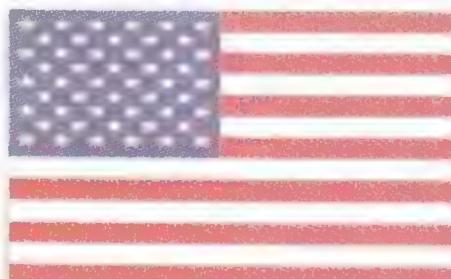
In the front of the MS-DOS Reference Manual was an insert sheet explaining how to use *CGPDMP*. It seemed simple enough. Just reserve a certain amount of memory when you go to BASIC, BLOAD *CGPDMP.BIN*, and do a CALL when you want to take a snapshot of the screen. After the initial delight of seeing the CGP-220 quietly reproduce the screen, I noticed that the colors were now the same as those on my display. This is where the fun began.

To understand what's going on here, we'll need a little background knowledge on how the 2000's MS GW-BASIC uses color graphics.

With the Tandy 2000, you can have up to eight colors displayed on the screen at a time. You may say that you have a "palette" of eight colors with which you may "paint" on the color monitor. You may choose any combination of 16 available colors, numbered

0 to 15, to have on your palette. Once on your palette, the eight colors you chose are given palette numbers, 0 to 7. You may choose to put red, which is color #4, into the first position on your palette, which is called palette 0. You can arrange the colors on your palette in any order — color #6, for example, does not have to be in palette #6. This is all done with BASIC's PALETTE command.

Once you've set up your palette, the graphics commands that BASIC executes will use the eight colors you've chosen. If, for instance, you tell BASIC to draw a circle with, and tell it to use, color #2,



the circle that is drawn will use the color that is in palette #2, whatever color that may be.

When the CGP-220 "looks" at the screen, it does not pay attention to the actual colors that are displayed. It has its own ideas about what color goes with which palette. The machine language program, *CGPDMP*, only sees "palette" numbers, it does not care what colors are stored in the palettes, it always prints the same color for each palette number. Palette #0 always prints as black, palette #1 always prints as red, and so on. You may have light cyan stored in palette #1, and it displays as light cyan on the monitor, but when the



CGP-220 prints it, palette #1 is always red.

The following table shows how the screen print program treats the eight palette positions.

Palette	Color Printer
0	Black
1	Red
2	Green
3	Yellow
4	Blue
5	Magenta
6	Cyan
7	White

Note: The insert that comes with the MS-DOS manual states that #5 is cyan and #6 is magenta. I've found the reverse to be true — at least on my printer.

If you want the display on the screen to match what is going to be printed, you need to put the proper colors on your palette in the proper positions. Put red (color #4) in palette #1, green in #2, yellow in #3, etc. The BASIC commands to do this are:

PALETTE 0,0	Black into Palette #0
PALETTE 1,4	Red into Palette #1
PALETTE 2,2	Green into Palette #2
PALETTE 3,6	Yellow into Palette #3
PALETTE 4,1	Blue into Palette #4
PALETTE 5,3	Cyan into Palette #5
PALETTE 6,5	Magenta into Palette #6
PALETTE 7,7	White into Palette #7

If you use these commands at the beginning of your BASIC graphics program (you can omit the remarks), the colors on your screen will match what is printed on the CGP-220.

This BASIC program reproduces a United States flag on the Model 2000's screen. Notice line 1040. This line sets up

the palette of the colors the program will be using. The colors are in the proper palette positions for the CGP-220 to accurately reproduce the screen. You do not have to have a CGP-220 printer to use this program (of course, you'll get no printout) — just type in the program and run it as is. Line 1000 controls the screen print function. If it reads SP=0, there will be no screen print. Change it to read SP=1 if you want a screen print.

For those who have a CGP-220 Ink Jet Printer, you must reserve a certain amount of memory for the *CGPDMP*

.BIN machine language routine when you enter BASIC. From the MS-DOS prompt, enter:

**BASIC / M:&H7700** for 128K systems,  
or  
**BASIC / M:&HFF00** for 256K and up.

BASIC will reserve a portion of memory large enough for *CGPDMP.BIN*.

Before you can print a screen, you must BLOAD the screen dump program, *CGPDMP.BIN*, which should be on your disk. Do this by putting a line such as the following near the beginning

of your program:

**CGPDMP=&H7700:BLOAD**  
**"CGPDMP.BIN",CGPDMP**

If you have 256K or more, change the "&H7700" to "&HFF00". When you're ready to print the screen, issue the following BASIC command:

**CALL CGPDMP (ER%)**

In about 60 seconds, your graphics image is reproduced on paper for you to put in a report, show off to colleagues, or even frame.

#### The listing:

```

1000 SP=0
1010 IF SP THEN CGPDMP=&HFF00:BLOAD"CGPDMP.BIN",CGPDMP
1020 DIM STAR(250):SCREEN 3:CLS:KEY OFF
1030 ' *** Set all colors to black to make graphics invisible ***
1040 PALETTE 1,0:PALETTE 4,0:PALETTE 7,0
1050 ' *** Draw a star ***
1060 LINE(0,0)-(639,384),15,BF
1070 LINE(51,8)-(77,28),4,BF
1080 LINE(73,28)-(64,8),7
1090 LINE-(55,28),7
1100 LINE-(77,15),7
1110 LINE-(51,15),7
1120 LINE-(73,28),7
1130 PAINT(64,11),7,7
1140 PAINT(54,16),7,7
1150 PAINT(64,16),7,7
1160 PAINT(74,16),7,7
1170 PAINT(60,(116)*.2),7,7
1180 PAINT(68,(118)*.2),7,7
1190 ' *** Get star into array ***
1200 GET(51,8)-(77,28),STAR
1210 ' *** Draw red stripes ***
1220 FOR I=0 TO 400-(400/26) STEP (400/(13/2))
1230 LINE(0,I)-(639,400/13+I),1,BF
1240 NEXT
1250 ' *** Draw blue field ***
1260 LINE(0,0)-(300,215),4,BF
1270 ' *** Turn on colors to make stripes and field appear ***
1280 PALETTE 1,4:PALETTE 4,1:PALETTE 7,15
1290 ' *** Put stars in field ***
1300 FOR X=25 TO 275 STEP 50:Y=25:GOSUB 1410:NEXT X
1310 FOR I=1 TO 8 STEP 2
1320 FOR X=50 TO 275 STEP 50:Y=25+I*21:GOSUB 1410:NEXT X
1330 FOR X=25 TO 275 STEP 50:Y=25+(1+I)*21:GOSUB 1410:NEXT X
1340 NEXT I
1350 ' *** Draw black border ***
1360 LINE(0,0)-(639,399),0,B
1370 ' *** Print Screen on CGP-220 ***
1380 IF SP THEN CALL CGPDMP(ER%)
1390 ' *** Endless loop ***
1400 GOTO 1400
1410 ' *** Put star on the field ***
1420 PUT(X-13,Y-13),STAR,PSET:RETURN

```

## Reviews

A special report on *DISK+* and the Holmes Wafer Drive

# Mass Storage: The Software And Hardware Arrive

By Jim Hawk  
PCM Contributing Editor

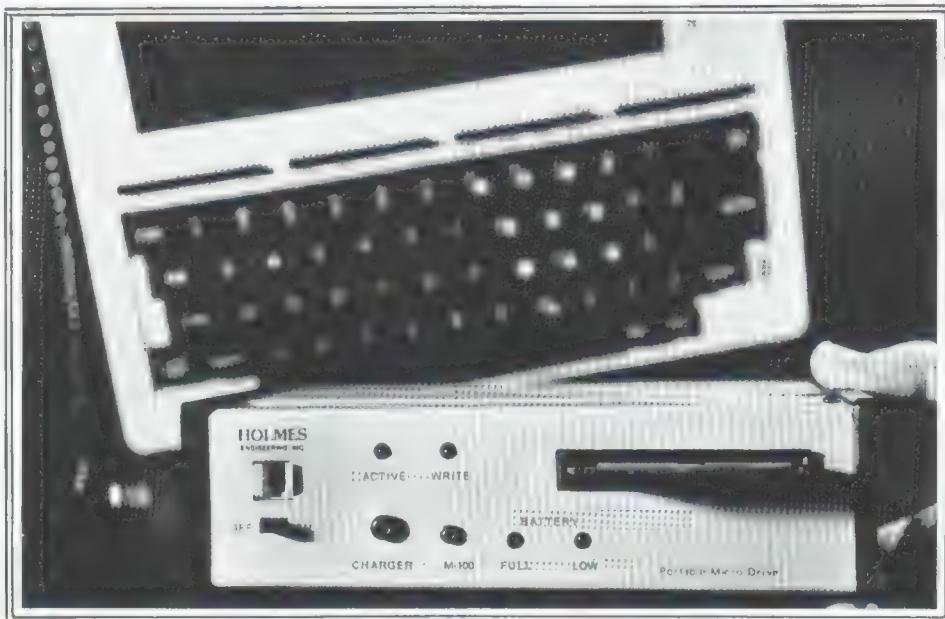


PHOTO BY JOHN KOPP

The February issue of *PCM* had a special article on mass-storage technologies like wafer and disk. Now, two new products discussed in that piece are hitting the market and *PCM*'s Jim Hawk has been busy testing both a sturdy wafer drive and a software breakthrough that lets you easily use a Model 2000 or other disk drive to store entire Model 100 menus, among other things. We thought both products were not only unique but so important to portable computing they deserved expanded coverage.

If you own or plan to own one of the new Tandy 2000s, or have an IBM, Apple or TRS-80 Model 4, some software has just become available that will make your Model 100 store and retrieve data from your PC's disk drives with incredible speed and ease. The even better news for those of us not so lucky

to own second computers: a portable, battery powered disk drive will soon be available and use virtually the same software to make disk operation easier than it's ever been before (more on that after we describe *Disk+*).

Getting two computers to talk to each other used to be inconvenient, cumbersome and even risky. So when I first heard a description of *Disk+* from Sam Redman at the Portable Computer Support Group in Dallas, I thought he was giving me a tall Texas tale. Sam told me that using a null-modem RS-232 cable to connect the 100 and the other computer, you could save to disk any file (or all your 100's files at once!) with a single function key. He said you could transfer any kind of file from RAM to disk, or disk to RAM — again with only a function key. It's also just been made official that *Disk+* will soon be the operating software for a stand-alone portable disk drive! Under wraps for months, PCSG has been working with Percom Data to create a portable 3.5-inch disk machine using the 100's RS-232 hookup. All of these remarkable developments center around a similar machine language soft-

ware development selling as *Disk+* and I was fortunate to be among the first to try the version for Radio Shack's TRS-80 Model 4. Basically, the *Disk+* program that comes on cassette for the 100 and on disk for your other computer turns the PC into a "slave" computer. A nearly identical version for the Tandy 2000 should be on sale by the time you read this. PCSG says the method of operation is the same in each version, and I found Sam was not exaggerating about those single-key functions.

### How *Disk+* Works

Just to describe the many features of this software is to unveil its simple method of operation. As is usual from PCSG, the documentation is excellent: 33 pages complete with a sample operating session to talk you through the loading and wiring up process as well as all the operations. After wiring the two machines together using either Radio Shack's null modem cord or one offered from PCSG (and after loading *Disk+* into your 100), just place the diskette into the disk drive and turn on the power. Then from the main menu, place the cursor over *Disk+* and press ENTER.

(Jim Hawk has been working in radio news for the past 12 years and has a science and electronics background. He also does free-lance writing in Washington, D.C.)

Your PC's disk drive will kick on for a few seconds, loading the *Disk+* software. Although a few "handholding" messages appear on the Model 4's screen, all of the *Disk+* information stays on the Model 100's LCD screen. On the 100 screen you immediately see what looks like the main menu again (complete with the 10-character-across "wide bar cursor" in inverse video), but this menu has been titled "RAM files" and the function keys are labeled differently (except for F8 which still gets you back to the 100's menu).

The F1 key (Disk) will command the disk drive and display the directory of files for whatever disk you have inserted in the operating drive. The F3 key (Save) will automatically save any single RAM file to disk — you simply place the wide bar cursor over the file name and press F3 — the software runs the disk, names the file, checks for data integrity and returns you to the RAM directory. The F4 key (Size) is a nice feature; pressing it immediately reads out the file size in bytes for whatever program or text file the wide cursor bar is over (and it also works without being connected to the disk drive computer).

The F5 key (Kill) works almost exactly like the F2 (Save) key, but it gives you a chance to change your mind by asking "Are you sure?" — if you then press 'Y' the file is killed without having to type the full filename and extension. The truly innovative feature is the F6 key (SvAll); pressing the "save all" key will do exactly that — save all the current RAM files to disk, labelling each one by its original title and extension, then giving the group of files a "sub-directory" name (after prompting you for a six-character title). I was amazed the first time I tried it — the wide bar cursor moved from file to file at incredible speed and I got the feeling for the first time that 32K of RAM is no longer such a limitation.

To accomplish that feat on cassette would have taken much more time and effort; in fact, it's something I avoid unless a cold start is necessary for repairs. And when you press the F1 switch to go to the disk directory, you'll discover a similar function key setup — but the two save keys are now load functions. Pressing F2 (Load) will transfer from disk to the Model 100's RAM any single text or program file without need to do anything but move the wide bar cursor over to the desired file. And, if you've done a "save all" there's naturally a "load all" on the disk directory's function key 6. Just like the "save all" command, the "load all" very quickly creates RAM files then loads from disk, zipping the wide cursor bar across the screen. This ability to save all files and load them all back again at the push of a single button fits right in with the Model 100's key to success: ease of use. No longer do you have to always retain "must have" files — they can easily be dumped to a separate sub-directory and loaded and unloaded at literally the touch of a button. The F4 and F5 keys both remain the same on the disk directory — Size and Kill. F1 gets you back to RAM files, and F8 acts as the safety valve in case anything goes wrong, returning you to the 100's own menu.

namely that once you've answered yes to the "Are you sure" question, all the current RAM files will be replaced by the sub-directory being loaded. In other words, be sure you've made a save of the day's work before loading back your normal files.

#### Details On The Portable Disk+

The design specifications are already out and the first machines are expected around May 1st. They'll be powered by a rechargeable NiCad battery, and use the 3.5-inch diskettes now being made popular by Sony in the latest offerings from Apple and Hewlett-Packard. These diskettes were made for portables: enclosed in a rigid plastic shell with the opening for the read/write head covered by a spring-loaded sliding metal plate. Overall size of the machine will be four inches wide and about as tall and deep as the 100. The PCSG/Percom Data portable will be a ROM-based system using the same menu-type system as *Disk+*. It will store 400K of data on a single-sided diskette and hookup to the Model 100 via the RS-232 port. The price will be stiff — \$799 — but after seeing *Disk+* turn the Model 4 into the simplest to use disk machine possible, I'm quite sure you'll get what you pay for.

To get all of these disk-to-RAM (and back again) features into a 4K-size machine language program is proof that big things can come in small packages.

The code writers at Portable Computer Support Group have managed to make the operation of disk-based storage simpler and much more reliable than cassette. And with the pending debut of a portable disk machine that works in the same fashion, the Model 100 will truly become a portable computer unmatched in hardware or software.

#### Holmes Portable Micro Drive

Ever since the Model 100 was introduced early last year, there has been talk among 100 owners about a new kind of tape drive that would be faster and more accurate than cassette storage for programs and text. And, the February "Mass Storage" article in PCM pointed out breakthroughs in not only wafer drive but 3-inch disk technologies that promised portable units. That promise has now been fulfilled on the wafer side with the first deliveries of the Holmes Engineering "PMD-100 Portable Micro Drive." And after living with one for just a few days, I can confidently predict that a portable mass storage device like

*"Getting two computers to talk to each other used to be inconvenient, cumbersome and even risky. So when I first heard a description of Disk+ from Sam Redman at the Portable Computer Support Group in Dallas, I thought he was giving me a tall Texas tale."*

The error handling ability of *Disk+* is excellent — it seemed to be bug-free. I was unable to cause a lockup even after deliberately pulling the RS-232 connector cable! There's a file transfer feature to let your desktop computer do the finishing touches on a text file or run it through a spelling checker. I could go on but you'll really have to try it out yourself to feel the newfound sense of computer power *Disk+* enables. Now, the memory-expanded 100 can always have a solid 24K available . . . (not 32K because *Disk+.CO* occupies 4K and reserves another 4K for room to operate). Speed of operation more than makes up for the sacrificed RAM — I never would have dreamed my entire directory could be loaded in less than 60 seconds. That's because the loading is done at the 100's top speed — 19,200 Baud compared to 1500 Baud for cassette. The documentation does repeat a warning about the "load all" feature —

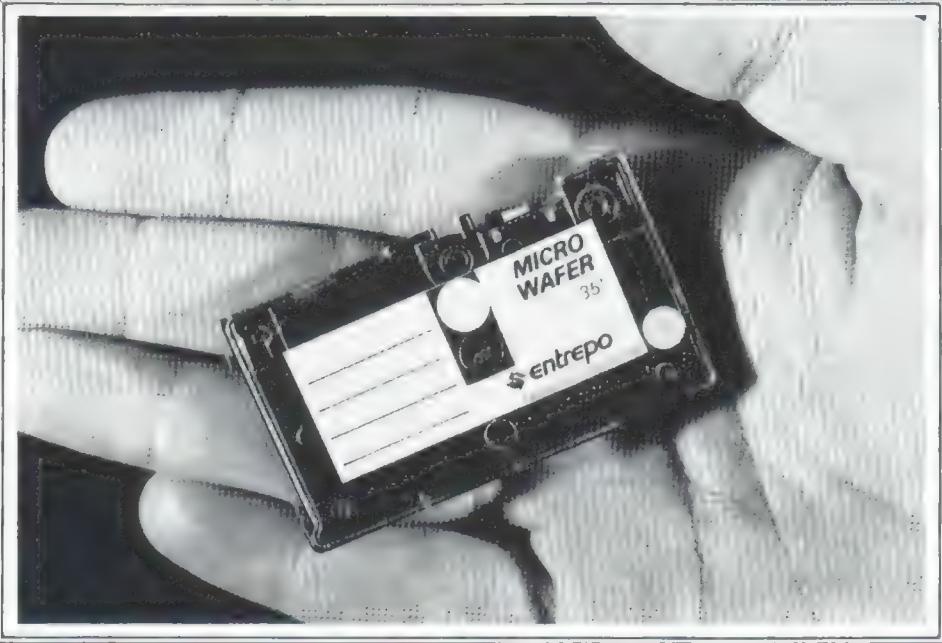


PHOTO BY JOHN KOPP

this will change the way you use your portable and enhance current applications.

The wafer drive/battery comes encased in a white metal box with plastic side panels of a wood-grain finish. Everything is located on the front panel, including four LED lights to indicate when the unit is on, when it's "writing" data to tape, and battery full/low indicators. The one and only switch is on/off . . . everything else is software driven through a series of menus that appear on the screen. A small, thin rectangular opening is where the wafer tape fits in — about as wide as a business card and half as thick as a cassette. Completing the front panel are three different sockets — one to accommodate the AC powered charger unit, another to connect a 6-volt power cord to your Model 100, and the third looks exactly like a modular telephone jack which connects the provided four-wire coiled cord to the RS-232 connector on the back of your Model 100.

The PMD-100 is heavier than its cigar box size would suggest (about four pounds) with most of the weight consisting of a large gel-cell battery that easily takes up a third of the interior. This extra-large battery capacity may be one of the Micro Drive's best selling points, because it not only powers the wafer drive and associated electronics but also the Model 100 attached to it. I was able to forget about locating near an AC outlet because the Holmes unit could run both machines just about all day. Everything you need to immediately

begin using the Portable Micro Drive is supplied, including three different sizes of "Micro Wafers" with the trademark of Entrepo Corporation on them — the same people who supply Holmes with the basic wafer cartridge drive. So-called "wafer tapes" are merely very small tape cartridges — continuous loops of tape that run in one direction only, but at very fast speeds.

#### How Does It Work?

To get started, you first have to load the operating software contained in the Holmes ROM, or "read only memory," to your Model 100. This is a one-minute procedure of going to *TELCOM* and downloading a file named *BOOT.D0*.

When you run the file, BASIC converts the text to a machine language file called *WAFER.CO*. (It can easily be left in place because it takes up only 960 bytes.) Then, it's simply a matter of placing the main-menu cursor over *WAFER.CO* and pressing ENTER. A wafer drive menu appears on the screen with the following eight single-key options: 'S' to save a file to tape, 'L' to load a file from a wafer tape, 'C' to get a catalog of what files are on a tape, 'F' to format the tape (much like you would with a disk), 'D' to delete the last file, 'Q' to do a so-called quick save, 'M' to list the Model 100's files, and 'E' to exit the program and get back to the main menu. Before actually storing anything on wafer tape, you first have to format them. This is done by pressing the 'F' key — the Holmes wafer drive then takes it from there, whirring away and

making very much the same sound as a standard cassette when fast-forwarding.

Once the tape has been successfully formatted (which also erases any old files that may have been on the tape), you see a message coming up saying "XX K available, Formated OK." Formatting the three sizes of tapes that came with the unit, I got 27K available for the 20-foot length, 47K for the 35-foot version, and 72K for the 50-foot tape. However, for practical use of the wafer drive I'd recommend using the shortest length. That's because the Holmes unit works exactly like a disk drive in checking each character for accuracy before completing the cycle. And it's where the difference between wafer and disk becomes apparent — a disk drive can move the read/write head exactly to the file specified, while the wafer must fast-forward through each file on a tape to get to a designated file.

And the process of verifying the file causes the tape to advance all the way around again. In other words, once you get several files on a given wafer tape it's going to take longer and longer to add new files. For example, it took almost two minutes to add a 664-byte file to a 35-foot wafer tape that contained four previous files totalling about 9K. This is worst-case, but even with the cumbersome cassette, I could have finished the job sooner. There's a very important difference though — the Holmes drive, like a disk, goes back to check that the data it has stored is exactly the same as the original file . . . something impossible with cassette. If you went back and loaded from cassette what you'd just saved to make sure it was there, the Holmes drive would have finished long before. Although the wafer drive is "serial" in nature, as opposed to the "parallel" operation of a disk, this verified form of tape storage may displace cassettes.

However, there are some inherent limitations to the wafer medium. Namely, that the tiny wafer "cassette" leaves the tape open to damage — the thin tape is left exposed at the point where the pressure pad is. Rather than coming in a protective plastic shell, the wafer cartridges were packaged in individual plastic envelopes — not the handiest. Also, because each cartridge has its own miniature capstan built-in, you can crease the tape by accidentally leaving it engaged in the wafer drive overnight. The advantage is mechanical simplicity — the drive unit itself is really just a two-

speed capstan motor and a single head, and the wafer tape has a positive snap when properly seated. If you can get around the fragile tapes, the Holmes unit has some very good features. Saving and loading of text, BASIC or machine language programs is a simple one button, type in the filename procedure. The catalog feature is nice — it not only lists the full filename and extension, it also tells you the number of bytes in each file. Another feature makes use of the PMD's built-in RAM: you can do a "Quick save" if the file is less than 12K and it almost instantly dumps into the PMD's memory, freeing up your 100 to do something else. If for some reason the verification process turns up an error, a warning light blinks. I did encounter a problem with this feature, as it appeared to have saved okay, but when I "cataloged" the file wasn't there. Also, if I accidentally hit "catalog" without a tape in the drive, it would lock-on and the only way to stop it was to turn both units off and start over again. Larry Holmes, founder of the company bearing his name, tells me a new ROM is being readied to correct those bugs, and should be installed in new units by the time you read this.

#### Conclusion: You Ain't Seen Nothin' Yet

The Holmes Portable Micro Drive is the first non-cassette form of mass storage on the market that is truly portable. But it's definitely not the last . . . Holmes gave me a preview of things to come like a portable disk using the 3-inch Hitachi system (instead of the 3.5-inch Sony format to be introduced by Portable Computer Support Group). Holmes also is working on a smaller portable wafer drive, a RAM board that could be added inside the 100 to give it another 64K of "switch-banked" memory, and even a possible video interface using a new chip that would solve some of the software compatibility problems of Tandy's Disk/Video Interface. Things are hot and heavy in the portable field, especially with the Model 100. Many thousands already are being used and recent price cuts will only accelerate its place in computer history. The market for third-party hardware and software makers keeps getting better every day. Holmes engineering has come up with a versatile and reliable mass-storage device in the PMD-100 that doubles as a super-capacity battery. For \$349 it's about half the cost of portable disk drives

promised for the 100. If you're looking for a single peripheral combining extraordinary battery power with a unique disk-like storage medium, the Holmes Portable Micro Drive may be just what you've been waiting for.

**(PMD-100 Portable Micro Drive — \$349.95 from Holmes Engineering Inc., 5175 Green Pine Drive, Murray, UT 84123. Phone: [801] 261-5652)**

**(Disk+ for the Model 4 — \$59.95 from Portable Computer Support Group, 11035 Harry Hines Blvd. #207, Dallas, TX 75229. Phone: [214] 351-0564)**

## SOFTWARE

### Dr. Preble's Fantastic Flying Machine

By Vincent Lord

Well nasty old winter has finally decided to leave this section of the country and it's time for many of us to take to the beautiful spring skies and look at the marvelous green scenery. Where do you like to visit? How about a nice trip south or north in your plane or your friend's. Don't have a plane? Don't despair, there may be hope yet.

If you do have a plane, did you know that your Model 100 is all you need to have an on-board computer which can direct you through the friendly skies of the U.S.A. And to help you plan your trip, Dr. Preble's Programs has released an exciting new tool to help you really have that on-board computer you've really wanted. Have no fear though about the computer messing up your navigation instruments (see PCM April, Page 22). The only possible problem I see in using your computer is putting it in your lap during takeoff when you have to pull the stick back. But anyway, let's get flying with Dr. Preble's fantastic *NavComp V1.0*.

There are two programs on a tape plus an 18-page manual. The programs consist of *NavPln*, which is the navigational planning program and the second is the *NavAid*, which is a real-time navigational flight progress program. The minimum system requirements for the software are 16K of memory, a cassette, and an optional printer. If you are short on memory, both programs will stand alone.

*NavPln* is first loaded and executed. It creates two files or modifies parts of previously created files. The first file is called a Navigation Log and can be saved to RAM memory or to your cassette file. If it's very long I suggest you save it on cassette. The second file created is the Trip File. The Trip File contains all the important information for planning your flight. The following list contains the information requested:

- Rate of climb and descent
- Indicated airspeed
- Cruise altitude
- VOR identification including radials and frequencies
- Temperatures, winds aloft, and magnetic variations
- Distance, check points, route names, and auxiliary VORs
- Up to 10 flight legs can be entered.

Entering information could take some time as much of the information, if you fly like me with plenty of check points and cross radials from VORs, must be read in off the sectionals, unless you have IFR charts available. Once the information for each flight leg is entered then the computer prepares the two files mentioned previously. Since both are stored as text files you can list them to a printer or examine them. The Navigation Log is the one to print out if you want a hard copy, which is very nice to have as it has your trip summary with all check points, on-time routing, and navigational references. You really could get by with just this part of the package, but why miss the best part.

The second stage of the computer program is the real-time portion, which I think is the greatest and most interesting piece of software of this kind for any small type computer. What does it do? Well, hold on! When you run *NavAid* and couple it with the previously created Navigational Log program, you have a real-time program. It first asks you for the time of departure. If it's at present just hit the ENTER key and it automatically reads the computer's real-time clock, provided it's set to the correct time — either local time or Zulu time which I recommend. As soon as you're airborne the computer starts telling you when the first check point is to occur and even when to level off. There is a fantastic graphical representation of elapsed time and ETE (elapsed time enroute) and ETA (estimated time of arrival). Even fuel consumption is monitored. When you reach a check point all

you have to do is press the F1 key and your airspeed, ETA, and ETE are automatically updated. Want to know where you are between check points? The computer figures from the VOR information what the radials and distances from the VORs are. Want to know what magnetic headings to take? The computer will calculate the true headings based upon the wind directions and the magnetic variation. If you want more information, then go to the master menu where there is a cursor selectable menu very similar to the one used by the computer. You can select from the following items: last check point; VOR; total distance; gallons per hour fuel; route presently on; altitude (especially useful when climbing or descending), temperatures; density altitudes; winds; distances remaining for both the current leg and total flight; ETA and ETE; fuel left; next check point; continuously updated airspeed, ground speed and true airspeed.

In addition to being continuously updated by the computer, you can change enroute the VOR positions, cancel the flight (as far as the computer is concerned, I hope), increase and decrease the distances, update current position, and update current airspeed. If you find yourself low on battery power, then just turn the computer off. When you come back to it, it will be in time with your flight, not where you left off. A quick upgrade of the check points and you're back on course. When you need to start your descent, the computer will tell you, and if you forgot to plan too well, it'll give you a beeping signal informing you that you have only one hour of fuel left.

The first time I ran these programs I felt a little overwhelmed with the amount of information available right at my fingertips. I guess in the past all this information was floating through the cockpit but little used. A sectional and a PC-4 flight computer (really a circular slide-rule) seemed to be all that was necessary, and I guess a dozen or so sheets of paper with various notes scribbled on them. Now I can put all my trash away and come clean with a real-time, big-time professional navigational program for my flying habits.

If you fly for fun or profit and can't afford a several thousand-dollar onboard computer, then for less than \$1,000, including a 24K computer, you can have one of the more sophisticated

flying computers available. Dr. Preble has made an outstanding contribution to those of us who stall out once in awhile, but not anymore with *NavComp*.

(Dr. Preble's Programs, 6540 Outer Loop, Louisville, KY 40228, \$49.95 plus \$1.50 S/H)

## SOFTWARE

### Model 100 Assembler Performs 'Quite Well'

The *Model 100 Assembler* from Custom Software does what it is supposed to do, albeit slowly. Requiring 16K RAM and a cassette recorder, it is a good buy at \$22.95.

The *Model 100 Assembler* is an enormous BASIC program which takes a .DO file (on tape or in RAM) as input and produces a .CO file (to tape or RAM) as output. The .DO file, containing assembly language instructions, must be written using strict Intel 8085 mnemonics (e.g., MOV B,C). It will not accept Z80 mnemonics (e.g., LD C,B). Because it is written in BASIC, it takes a very long time to run and fills up a substantial portion of RAM, about 11K not including variables. The user's manual suggests that a machine language assembler is planned, and that it will be made available at a reduced cost to purchasers of the BASIC version.

#### Pseudo-opcodes

The assembler accepts the usual pseudo-ops: ORG, EQU, END, DEFB, DEFW, DEFS, DEFM and \$ (which represents the current memory location). It will print an assembled code listing, and a symbol table, if desired. The source code must be complete in and of itself; there is no provision for references to routines that would be linked separately, for example.

The program does not do very well in its handling of assembly errors. If a syntax error is encountered, for example, only the line number is given. One must then consult a paper listing to try to guess which line caused the problem; in a hundred-line program this can be quite annoying. The assembler should print, verbatim, the offending line; ideally, it would also point out how far across the line it got before it encountered the error.

#### Documentation

The 12-page manual is hand-typed

and photocopied, but serves its purpose well; it simply explains how to use the assembler. A Model 100 owner who does not already know how to write an assembly language program will have to look elsewhere to learn how.

#### Customer Support

This reviewer found one bug in the assembler — it would not accept a Hex constant with a value of zero. Soon after I reported the problem, a computer-generated post card came to me (and presumably to all other purchasers) with a patch to correct it. That speaks well for Custom Software.

The program is shipped on a non-copy-protected tape, and this writer had to make several dozen attempts before the program would load. According to the manual, it is also available on a Model III data diskette; hence it can be downloaded from the Model III to the Model 100.

In my opinion, the Custom Software assembler does the job quite well.

(Custom Software, 605 North C, #2, Wellington, KS 67152, \$22.95)

— Carl Oppedahl

## New Products

### New SuperCalc® 3 For The Tandy 2000

*SuperCalc® 3* has been announced for the Tandy 2000. For professionals and managers, the program includes a spreadsheet, data management and presentation-quality graphics.

This version of *SuperCalc3* utilizes the capabilities of the 2000. (The Tandy 2000 features twice the resolution, twice the number of colors and twice the floppy disk storage of the IBM® PC and has been benchmarked at almost three times the speed of the IBM PC for some operations.)

*SuperCalc3* provides 63 columns and 254 rows (16,002 possible entries) for the electronic spreadsheet. It allows building command sequences, called executive files or "macros" to simplify often-used operations. Information from multiple spreadsheets can be consolidated, and "help" is available on-screen with a single keystroke.

Features include individually variable

(continued on Page 54)

Before scanning any of the bar code listings contained in this section into your Model 100's memory, please be sure to carefully read the information on this page.

### BAREAD Update

The first coded listing in this section is the new *BAREAD*, which is a revised version of April's *BAREAD* program. We have coded this new program in last month's format, so that it may be scanned into memory with the April version of *BAREAD*. (One change you will need to make to this coded version of *BAREAD* after you've scanned it, is to edit Line 20 to read CLEAR 800, 61788 instead of CLEAR 300, 61788. This change is necessary in order to avoid "?OS" errors, and was discovered too late to be reflected in the bar coded version. If you have a D/VI, change the line to read: 20 CLEAR 800.) All the rest of the bar coded listings in this issue may then be scanned with your new *BAREAD* program. Of course, if you don't have the old *BAREAD* program, you will need to type in this month's updated version, which you'll find on Page 25 in BASIC form.

### Five Easy Pieces (FEP)

Because of the large size of *Five Easy Pieces*, we have divided the bar code listing into two parts. You will need to scan each listing as a separate program and merge the two together once they're both in memory. Follow the steps outlined below.

1) Use the *BAREAD* program

to scan in the first listing (*FEP1.DO*).

- 2) *BAREAD* will return you to MENU. Enter BASIC and type LOAD "FEP1.DO".
- 3) Type KILL "FEP1.DO" to remove the ASCII RAM file.
- 4) Type SAVE "FEP" to save the compressed BASIC file.
- 5) Use *BAREAD* to scan in the second listing (*FEP2.DO*).
- 6) Return to BASIC and type LOAD "FEP" to load our first BASIC program into working memory.
- 7) Type MERGE "FEP2.DO" to merge the second portion into the program in memory.
- 8) Type KILL "FEP2.DO" to free the space in your Model 100's memory.

A BASIC file called *FEP.BA* will now be stored in memory. You can now RUN it or save it to tape or disk.

Technical note: We use this method to avoid having a large ASCII file in memory. When you load an ASCII file in BASIC and save it as a BASIC program, the saved version is "tokenized" (compressed). The result is a great savings of your precious memory. When we kill the original ASCII file we free a large portion of memory to be available for loading the second part.

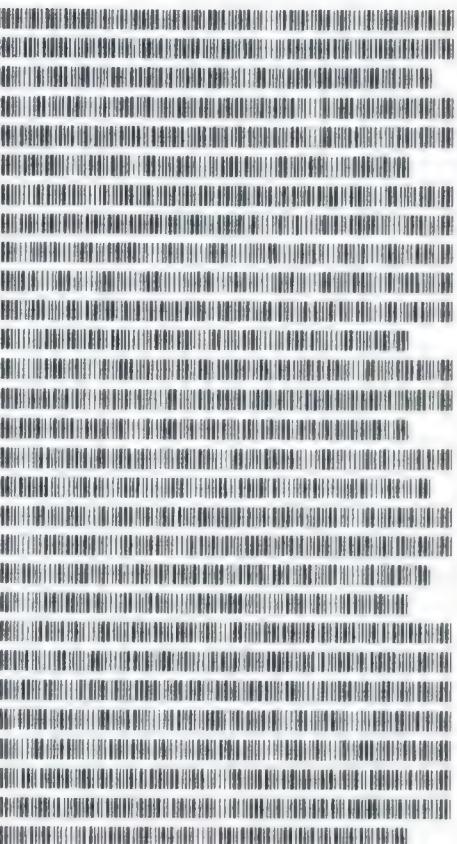
### Tips for Successful Bar Code Reading

We are constantly working to improve the quality of the reproduction of PCM Bar Code;

however, some of you may experience problems due to minor flaws in the bar code. As you become more accustomed to using the bar code wand, most of your problems will disappear. The following tips should help you become a successful bar code reader.

- Use an even, smooth speed.
- Keep a constant angle to the code (slightly less than 90°).
- Use your arm to move the wand — not your wrist.
- Use a straightedge such as a plastic ruler or an index card to guide your wand evenly across the code. A metal edge could damage your wand.
- If you experience problems scanning a line, move your straightedge slightly up or down and try reading a different part of the code — there may be flaws in the printing on the spot you're trying to read.
- Use a back-and-forth motion when a line does not read in on the first try.
- Make sure that the tip of your bar code reader is free of dust.
- Keep the LED on your bar code wand clean.
- Use a piece of non-reflective plastic, such as the one provided with your bar code wand, to protect the code from scratches.

# BAREAD



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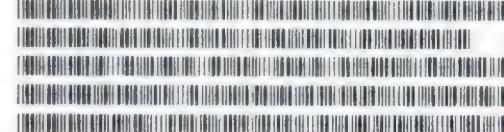
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# FEP 1

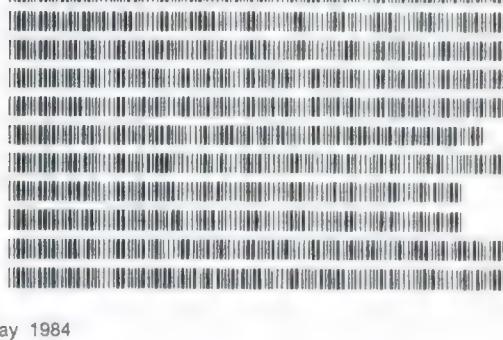
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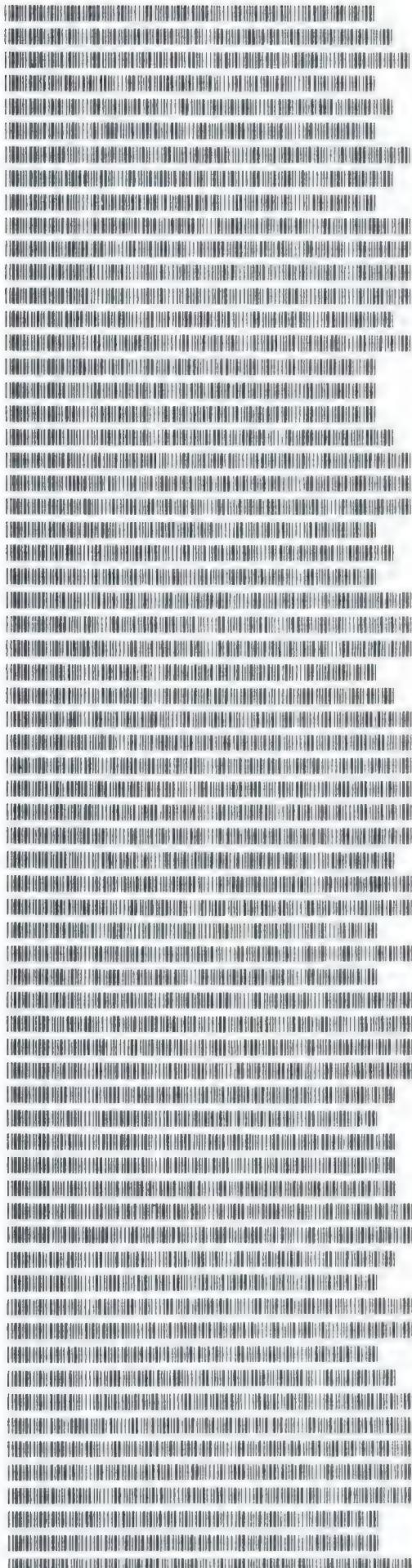


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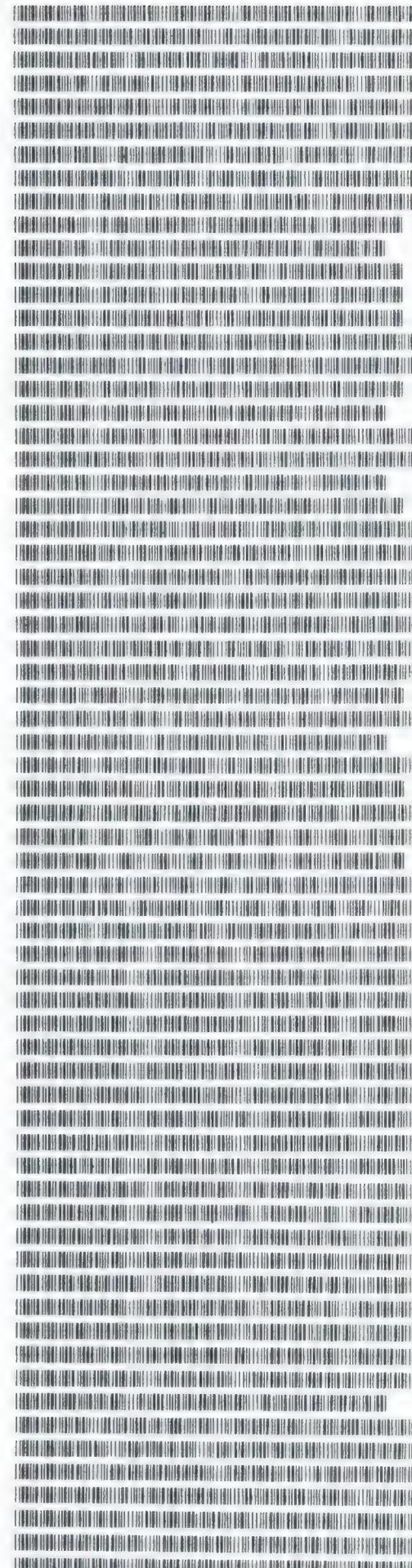


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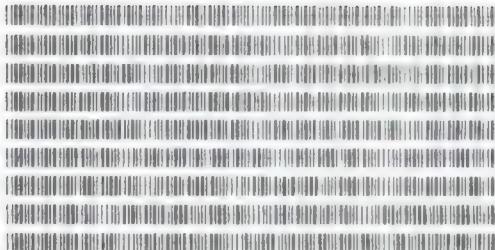


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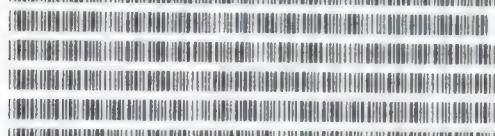
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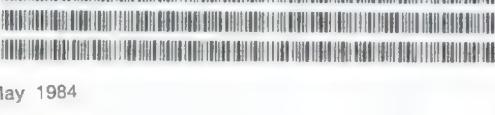
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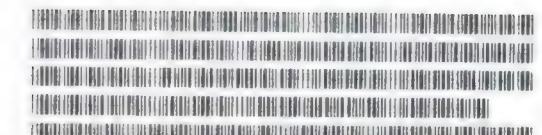
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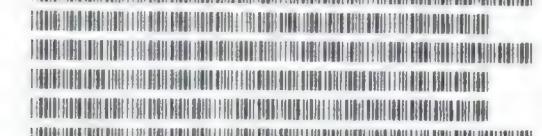
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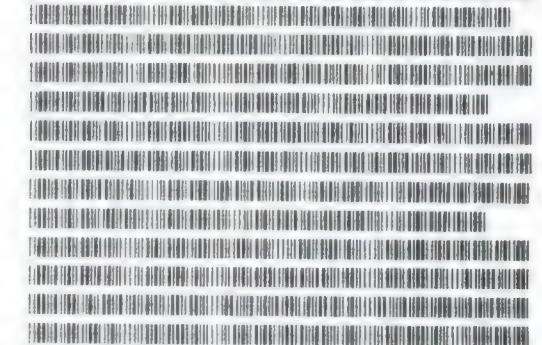
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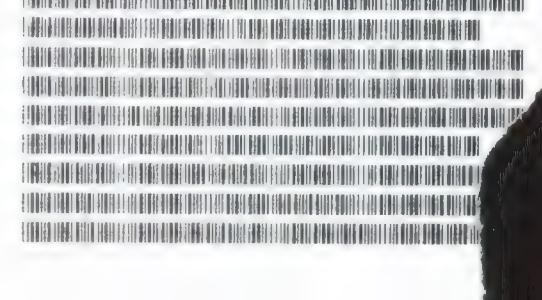
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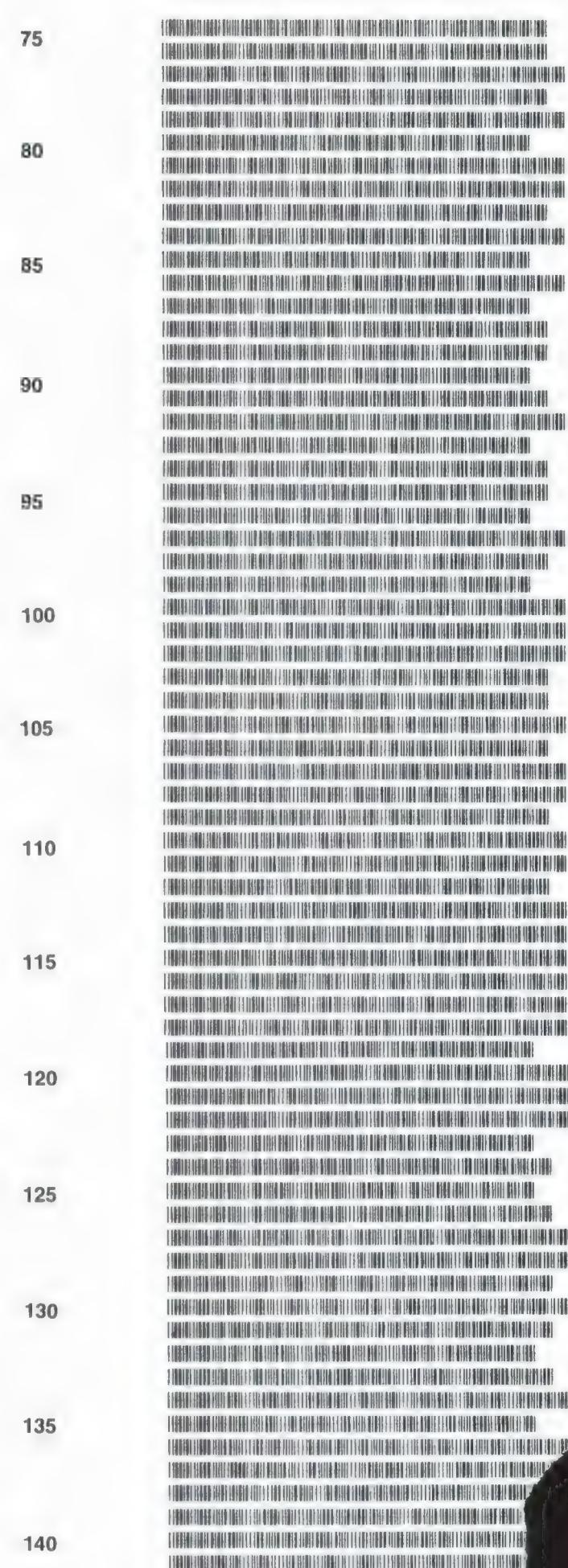
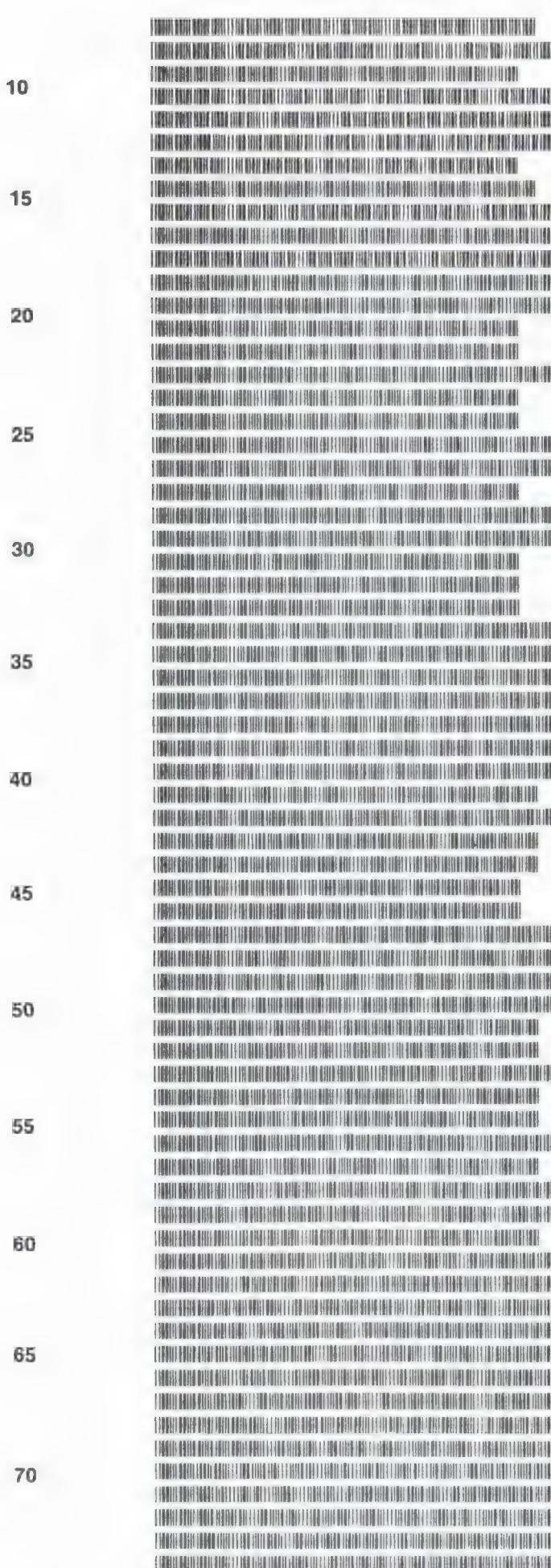
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# The Rackseller

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<b>DELAWARE</b> Wilmington	Normar Inc.—The Smoke Shop	<b>MAINE</b> South Portland	Portland News Co.	<b>RHODE ISLAND</b> Newport	Kelly's Variety
<b>FLORIDA</b> Ft. Lauderdale Miami Panama City Pensacola Tallahassee	Software Connection Newsrack Computer Systems Group Anderson News Co. Anderson News Co.	<b>MARYLAND</b> Lexington Park	Books, Etc.	<b>SOUTH CAROLINA</b> Greenville North	Palmetto News Co.
<b>GEORGIA</b> Atlanta Columbus Trenton	Guild News Agency Muscogee News Co. The Phone Line	<b>MASSACHUSETTS</b> Littleton Marlboro	Computer Plus Radio Shack	<b>CHARLESTON</b>	The Green Dragon
<b>ILLINOIS</b> Chicago	Kroch's & Brentano's Jackson Street Kroch's & Brentano's Wabash Ave.	<b>MICHIGAN</b> Novi Rochester Sterling Heights	MI Software Dist., Inc. Rochester Book Center Software City Programs, Inc.	<b>TENNESSEE</b> Knoxville Memphis Nashville	Anderson News Co. Computer Center Mosko's Book Store Delker Electronics, Inc.
Chicago Oakbrook	Prairie News Agency Kroch's & Brentano's	<b>NEBRASKA</b> Lincoln	Hobby Town	<b>TEXAS</b> Dallas Ft. Worth	Micro Concepts, Inc. A & A International Byteworks, Inc. RFI Electronics Software Access
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<b>CANADA:</b> <b>ALBERTA</b> Calgary		<b>NEW MEXICO</b> Albuquerque	News and Bookstore Page One Newsstand	<b>CANADA:</b> <b>ALBERTA</b> Edmonton	Rainbow Software Services Kelly's Software Distributors
<b>NOVA SCOTIA</b> Halifax		<b>NORTH CAROLINA</b> Cary Raleigh	It's Just For You, Inc. Softmart	<b>NOVA SCOTIA</b> Halifax	Atlantic News

Also available at selected B.Dalton Bookseller stores in the United States and Canada.

column widths, calendar/date calculations, one or two-key sorting, and floating dollar signs.

*SuperCalc3* (26-5302) is priced at \$395. Contact Radio Shack for further details.

## New Bar Code Development

Another new dimension in bar code technology has been introduced on the market. Six new decoder programs can now be coupled with the Model 100 for fast, portable and reliable data entry. Dallas-based Portable Computer Support Group (P.C.S.G.) has developed the programming.

PCSG claims "Until now a competitive product was \$1,400 and up. Our decoder programs with the Hewlett-Packard pen-like wand sell for \$99.95, making the entire package under \$875." The following is a summary of the programs.

The U.P.C./E.A.N. decoder occupies

only 1K of memory. It can read both long (five digit) and short (two digit) extensions on four codes. One decoder can decode 12 different types of codes. It includes internal error checking, and automatically expands the short codes up to their correct long representation. Like all the Portable Computer Support Group drivers it is callable from an assembly code program, or it can be accessed from BASIC with an OPEN "Wand" statement.

Code 39, or 3 of 9, is a bar code with a full alphanumeric character set. This bar code pattern is able to read both letters and numbers. It has 43 characters: 10 digits, 26 alphabetical letters, and six symbols.

*Codabar*, P.C.S.G.'s highly reliable program for a wide variety of industries, works in the same simplified manner as the other decoders. It is a bar code with a numeric character set (0-9), six control characters, and four unique start/stop characters.

Portable Computer Support Group's 2 of 5 and Interleaved 2 of 5 drivers work with a numeric character set with

different start and stop characters.

The final decoder program is a Plessey format, either lithographed or computer printed.

## RS Investment Analysis Package

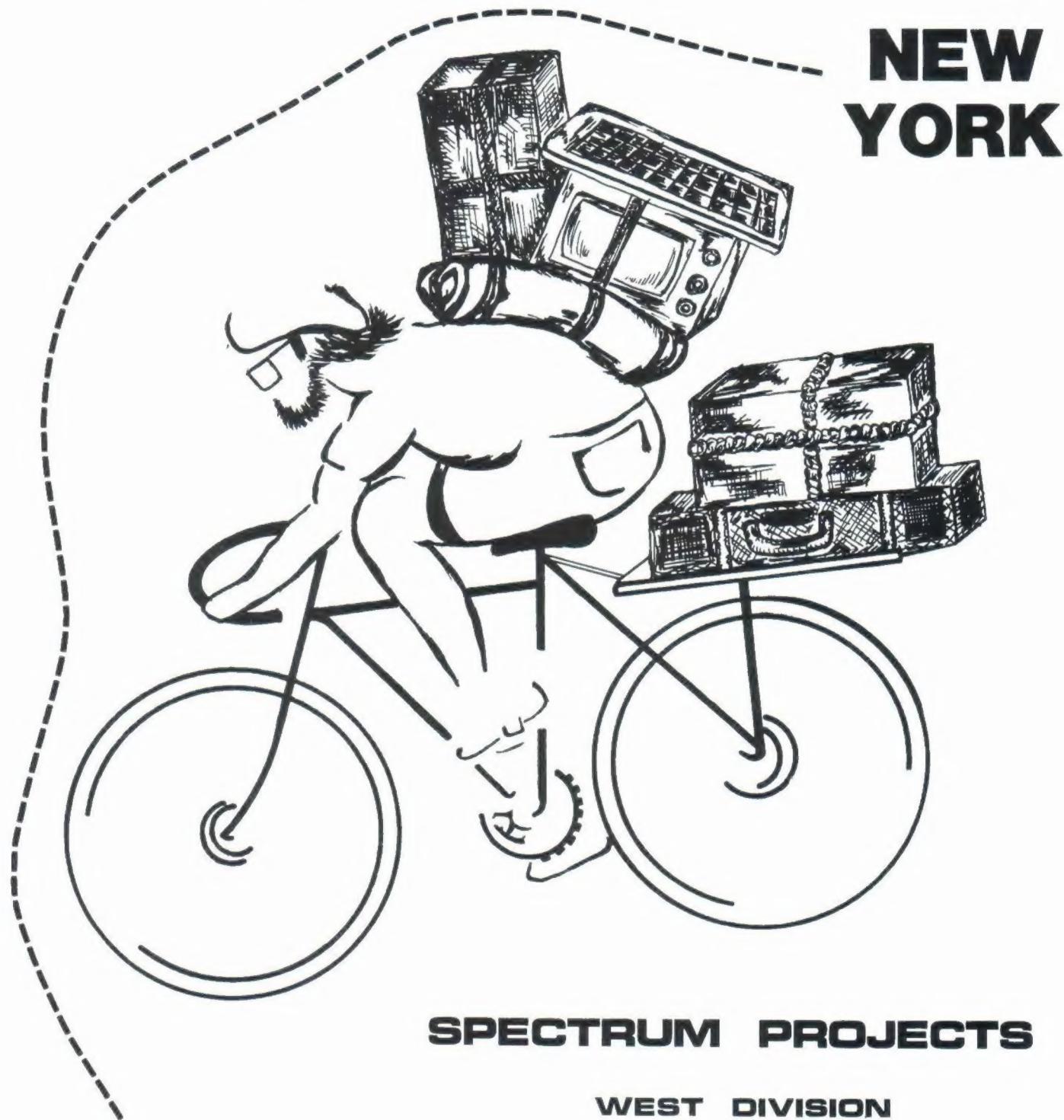
This new Investment Analysis package from Radio Shack consists of three separate programs for the Model 100: *Fixed Income Security Evaluator (FISE™)* calculates information that is useful when buying or selling fixed income securities; *Commission Calculator (COMM™)* calculates commission charges for stock and option transactions; and *Option Strategy Evaluator (OSE™)* calculates the results of option transactions involving various combinations of put and call purchases and sales.

The package requires at least 16K memory. It's \$69.95 at Radio Shack Computer Centers and participating stores and dealers nationwide.

**To better service the CoCo community**

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EXPANDS WEST !**

**NEW  
YORK**



**SPECTRUM PROJECTS**

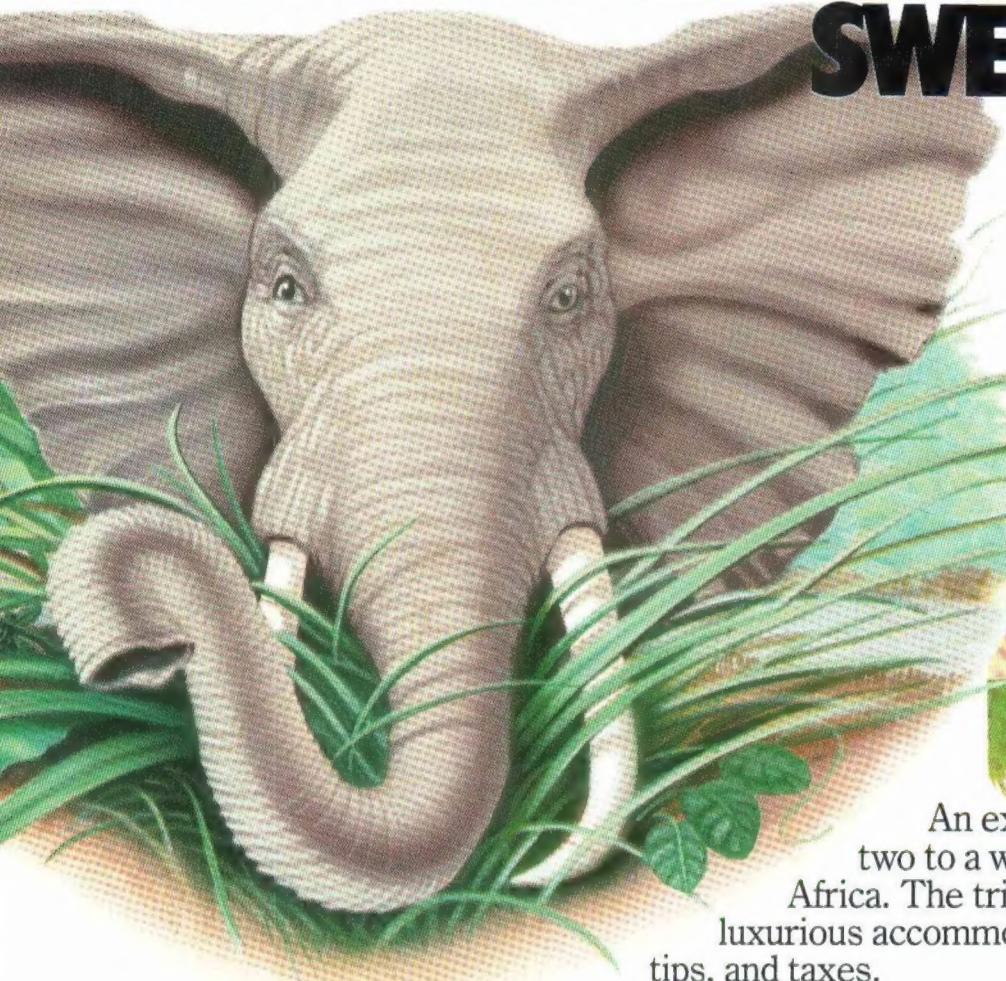
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**SAN  
JOSE**

**4285 PAYNE AVE/#9866**

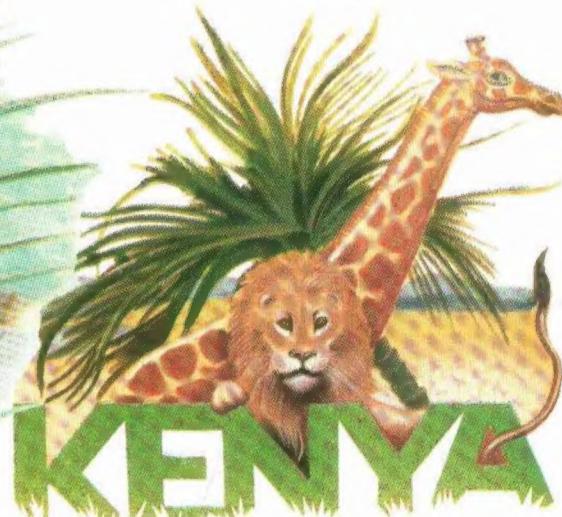
**SAN JOSE, CA 95117**

# ENTER THE ELEPHANT SAFARI SWEEPSTAKES.



## GRAND PRIZE

(1 winner)



An exciting two week adventure for two to a wild game preserve in Kenya, Africa. The trip includes airfare, luxurious accommodations, meals, tips, and taxes.



## SECOND PRIZE

(25 winners)

A Bell & Howell 35mm camera. The 35J complete with fine Lumina lens completely eliminates complicated focusing.



## THIRD PRIZE

(100 winners)

Camouflage

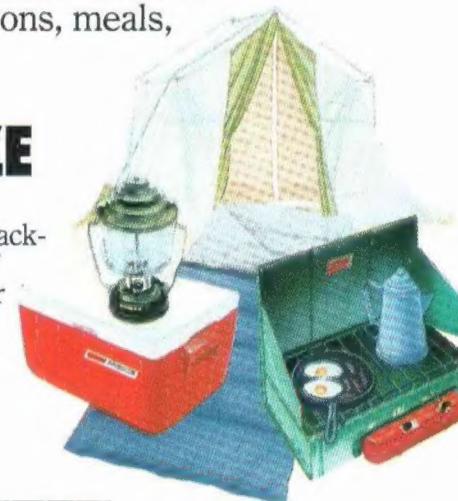
Nylon Duffle Bag. This handsome bag is water repellent and double reinforced at all stress points.

*And thousands of Elephant Safari camouflage T-shirts featuring the Elephant logo.*

## FIRST PRIZE

(5 winners)

A Deluxe Camping Package featuring an 8' x 10' Wenzel Cabin Tent, four Wenzel sleeping bags, plus a Coleman lantern, stove and cooler.

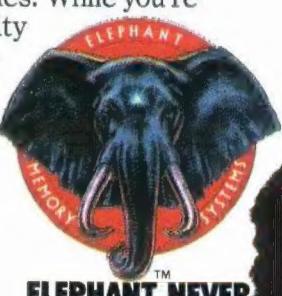


## HOW TO ENTER

No purchase necessary. Just come into a participating Elephant Safari Sweepstakes dealership where you'll find free entry blanks and official rules. While you're there, check out our full line of quality Elephant memory disks and accompanying products. Entries must be received by July 31, 1984. Void where prohibited.

**Dennison**

For the Elephant dealer nearest you, call 1-800-343-8413. In Massachusetts, call collect 617-769-8150.



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